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BRITISH LOCOMOTIVES IN 1927

DESIGNS AND WORK,

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Figs. 1 to 6, pp. 186 to 192.

I. — Designs.

As has been the case for several years past, there have been suggestions that the day is approaching when the orthodox design of locomotive would give place to a radically different type, but, so far, standard features have not been displaced in regular practice and the process of development continues to relate mainly to usual features and methods. This statement must, however, be interpreted generally, in that two of the new designs for the year use a steam pressure (250 lb. per square inch) never before employed in British locomotive practice; a third is the first three-cylinder simple 4-4-0 engine of modern design; a fourth represents the application of a high-pressure boiler to an existing class; while the fifth introduces the Garratt articulated design on a second of the great main line railways of the British Isles, and for « road » as distinct from « banking » service. In other respect, however, the year has not included radical departures from previous practice, though, on the initiative of private firms a Ljungström turbine locomotive, built by Beyer, Peacock & Co., Ltd., has been used to some extent for train-working on sections of the London Midland & Scottish Railway, and a Kitson-Still (combined steam and internal combustion) locomotive has been constructed and will probably be given service trials before long.

Figure 1 illustrates the first of the new « King » class of four-cylinder 4-6-0 locomotives built at Swindon to the designs of Mr. C. B. Collett, Chief Mechan-

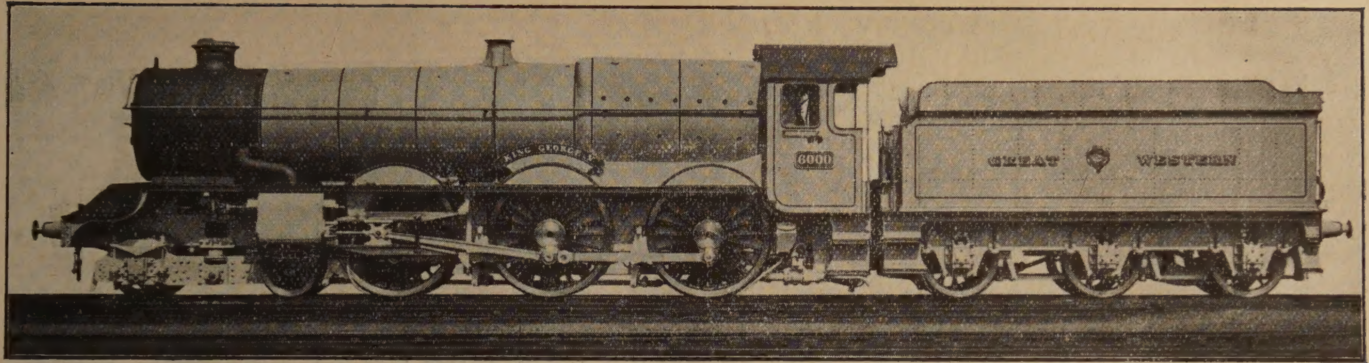


Fig. 1. — Four-cylinder 4-6-0 locomotive No. 6000, *King Georges V*, Great Western Railway.

Mr. C. B. Collett, Chief Mechanical Engineer.

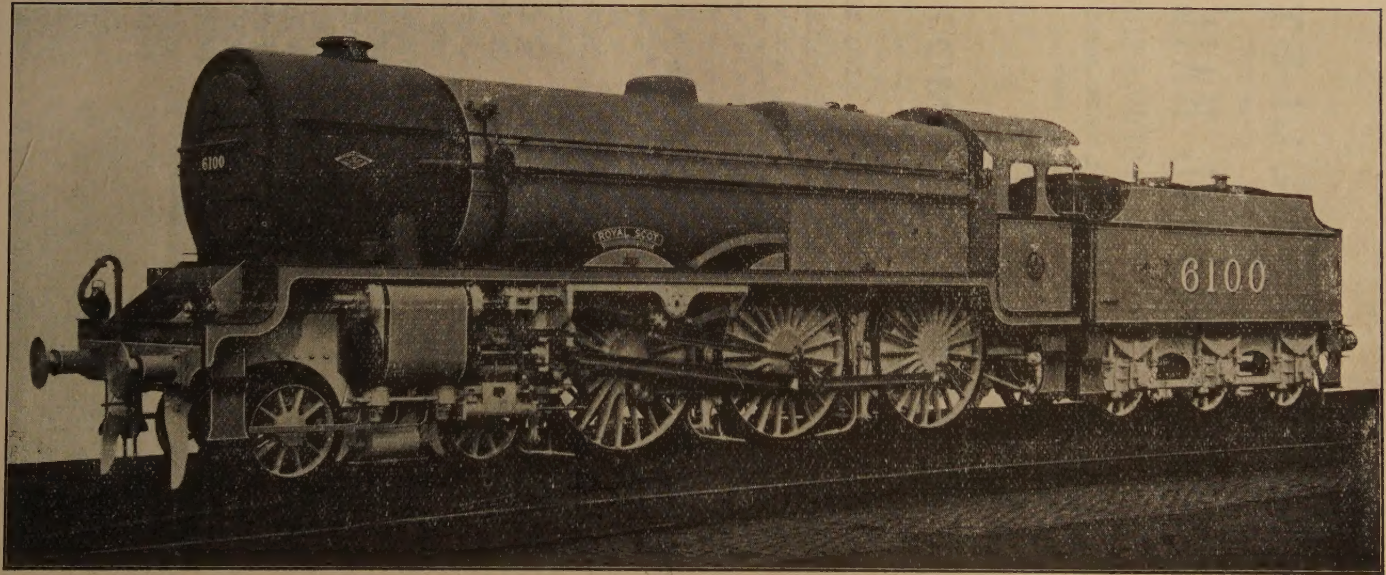


Fig. 2. — Three-cylinder 4-6-0 locomotive No. 6100, *Royal Scot*, London Midland & Scottish Railway.

ical Engineer, Great Western Railway. In general, it is a development of the well-known « Castle » class introduced two years ago, itself a development of the famous « Star » series which has done so much of the hardest express train working of the Great Western Railway for about twenty years. Both of these designs were characterised by the use of steam at 225 lb. pressure, so that the Great Western Railway has had considerable experience with high-pressure boilers. In the new engine, however, the boiler has been re-designed and the pressure raised to 250 lb. per square inch, and, at the same time, the adhesion weight has been raised beyond the limit hitherto generally recognised of 20 tons per coupled axle, so that there are now 67 1/2 tons on the six coupled wheels. It has, therefore, been necessary to undertake a certain amount of bridge strengthening on the routes used by these engines, and although it is intended to run them also on the London-Bristol, London-Birmingham, and London-South Wales routes, the six engines so far in service are at present still restricted to the London-Plymouth route, via Westbury, for this reason. It is, however, the work of this route for which they are mainly designed, in that their principal duties at present are the working of the London-Plymouth trains on their non-stop run of 226 miles, now accelerated to 240 minutes, and the heavy London-Exeter non-stops (accelerated to 175 minutes for 174 miles). The difficulty with the Plymouth run has been that on summer schedules, when the train has one « slip » section only, instead of three as during the rest of the year, the load to be worked over the terrific gradients between Newton Abbot and Plymouth has proved too much even for the « Castle » class locomotives, whereas the new engines can take nearly 400 tons over this stage and over 500 tons for the rest of the journey.

The increased power of the new locomotives has brought the tractive effort up to 40 300 lb. at 85 % boiler pressure, so that they rank as the most powerful locomotives in the British Isles. Outstanding points of interest in connection with the « King » class locomotives are : 1. the design of the bogie, which has outside bearings and springs for the leading wheels, and inside bearings and springs for the trailing wheels; 2. the higher boiler pressure, namely 250 lb. per square inch; 3. the weight distribution on the coupled wheels, namely, 22 1/2 tons per axle, a total of 67 1/2 tons; 4. the firebox and grate area; and 5. the tractive force developed by the locomotive. The adhesion weight is distributed by an equalising arrangement on the six coupled wheels. The weight carried by the bogie is 21 1/2 tons, the total of the engine in working order, without tender, being 89 tons.

The bogie, which is spring controlled, is, as intimated above, of unique design, having outside bearings for the leading axle and inside bearings for the trailing axle, this being necessary in order to obtain clearance between the bogie and the cylinders. The latter, four in number, are not set in a line across the engine, the two inside cylinders being placed well forward in the frames and driving on the leading coupled axle, while the two outside cylinders drive on to the middle coupled wheels. The design of the bogie and the weight distribution upon it are calculated to facilitate the movement of the engine at the front end.

Steam is distributed to the inside cylinders by piston valves with direct operation from the Walschaerts gear placed between the frames, the valves of the outside cylinders being actuated from the inside gear by means of rocking levers. The inside connecting rods have forked big ends fitted with gib and cotter, and the outside rods have solid bushed ends.

The boiler, which, as already mentioned, carries a working pressure of 250 lb. per square inch, is known as the Great Western Railway Standard No. 12. It has a conical barrel, a feature which for several years past has been standardised at Swindon, a Belpaire firebox, and no steam dome. The steam is taken from an open pipe at the highest point over the firebox, and a safety valve is mounted on the barrel. The inside firebox is of copper stayed entirely by direct steel and copper stays to the outside casing, and the standard Swindon type 16-unit superheater is fitted. The boiler is equipped with a top feed arrangement, the water being fed through pipes in the safety valve casing. The engines are fitted with the vacuum brake equalised on all the coupled wheels.

The cab is of spacious proportions, well protected by means of an extended roof and side windows. An excellent outlook is provided for the enginemen, and, indeed, the foot-plate is one of the best arranged and most convenient so far in service. The equipment includes an audible signal mechanism for use over sections of the line equipped for automatic train control.

The tender is of the new standard Great Western Railway six-wheeled pattern, equipped with water pick-up apparatus. It weighs, when full, 46 tons 14 cwt., has a coal capacity of 6 tons, and water capacity 4 000 gallons. The weight of the engine and tender in working order is 135 tons 14 cwt.

The engine illustrated was sent in the autumn to the United States in connection with the Baltimore & Ohio Centenary celebration, and there it attracted a great deal of notice. It was also given several trial runs on the Baltimore & Ohio line, where it put up some good performances, though the route was not one suited to the attainment of notably high speeds, while the English driver and fireman, who went over with the engine, were working under strange conditions and with a quality of coal not suited to the engine.

Figure 2 illustrates the first engine of the now famous « Royal Scot » class, designed by Sir Henry Fowler, K. B. E., Chief Mechanical Engineer, London Midland & Scottish Railway. This design also adopts a steam pressure of 250 lb. per square inch, and includes an increase in the adhesion weight above the usual limit, 62 1/2 tons in this case. Fifty of these engines have been built by the North British Locomotive Co., Ltd., 25 for service in England and the others in Scotland. They are designed to enable very heavy trains to be taken unassisted and to avoid the need for banking engines on certain very difficult sections, and in this connection they have proved very satisfactory indeed. Incidentally, they are now used for the longest non-stop run regularly scheduled on British railways — between London (Euston) and Carlisle, each way, 299 1/4 miles for which 345 minutes are allowed. This time has often been improved upon, though it is by no means an easy one in view of the number of places where speed has to be reduced, while so far no advantage has been taken of engine capabilities to reduce running time. This run is done usually with about 440 tons behind the tender. The new engines have been designed to develop a tractive effort of 33 150 lb. at 85 % of the boiler pressure, the latter being 250 lb. per square inch. The boiler and firebox are of large proportions, and ample grate area is provided. This combination of high boiler pressure with considerable firebox volume in conjunction with a large total heating surface, and grate area of 31.25 square feet, is a distinguishing feature of the design, which has been specially planned to provide sufficient power to haul efficiently the heavily-loaded express passenger trains on the main lines between Euston and Glasgow (Central).

The standard type M. L. S. superheater is fitted, other equipment including Davies and Metcalfe's exhaust steam injector; vacuum pump, in conjunction with standard large and small Dreadnought ejector; Ross patent pop safety valves; and a steam tube-cleaner. In addition, standard locomotive fittings have been provided wherever possible to facilitate interchangeability. A mechanical lubricator supplies oil to the cylinders, piston valves and spindles, and piston rods, while a second mechanical lubricator feeds oil to the coupled axle-boxes.

The length of the firebox is 10 ft. 3 in. As this increases the difficulty of dropping fires, a drop grate has been incorporated, this being operated from the cab by means of a hand lever. Every attention has been given to the provision of a comfortable, roomy, well-ventilated cab, and easy control of all fittings.

The inside cylinder drives on the crank axle of the leading pair of coupled wheels, and the outside cylinders the middle pair, separate Walschaerts valve gearing being fitted to each cylinder. Total weight of the engine in working order is 84 tons 18 cwt., of which 62 tons 10 cwt. are available for adhesion. A steam brake acts on the coupled wheels and also those of the bogie. The tender is fitted with steam and hand brakes on all the wheels. As the boiler is pitched rather high, the whistle has had to be set in a horizontal position to clear the gauge, while for the same reason a special pop safety valve has been designed.

Figure 3 illustrates the reboilered 4-6-2 engine of the London & North Eastern Railway mentioned in introduction. This engine, No. 4480, was sent into traffic from the Doncaster shops in the early part of July, having been fitted with a new boiler carrying a working pressure of 220 lb. per square inch. The same measures will be applied to other engines of the same class when being reboilered.

It is necessary to have spare boilers for engines when they come into the works for general repairs, and the opportunity has been taken to construct some of these spare boilers to carry a higher pressure. The object of this departure from the standard pressure of 180 lb. is to obtain comparative costs of maintenance and also to get some comparative data as to the life of fireboxes, stays and tubes between boilers carrying 180 and 220-lb. pressure, while at the same time ascertaining what economy in coal consumption, if any, results from the use of higher pressure.

An alteration has been made in the superheater to amplify the heating surface of the superheater elements, the number of which has been increased from 32 to 43. In the original arrangement there were four rows, each consisting of eight flue tubes. In the new arrangement there are five rows, the top row consisting of seven flue tubes and the others each having nine. No other alteration to the engine has been made except a slight modification of the Walschaerts valve gear, which had previously been effected on some of the other engines.

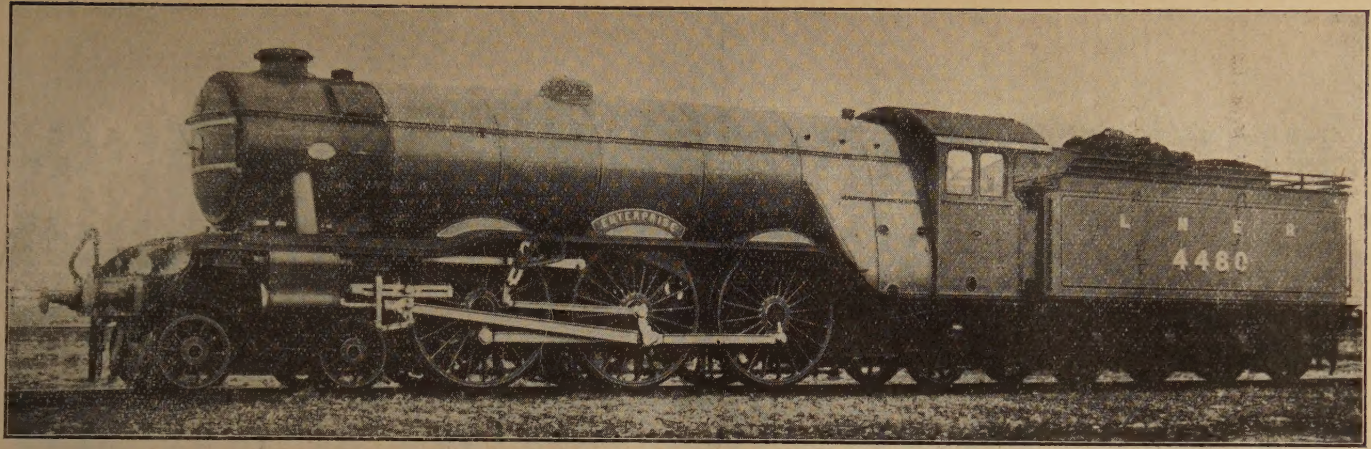
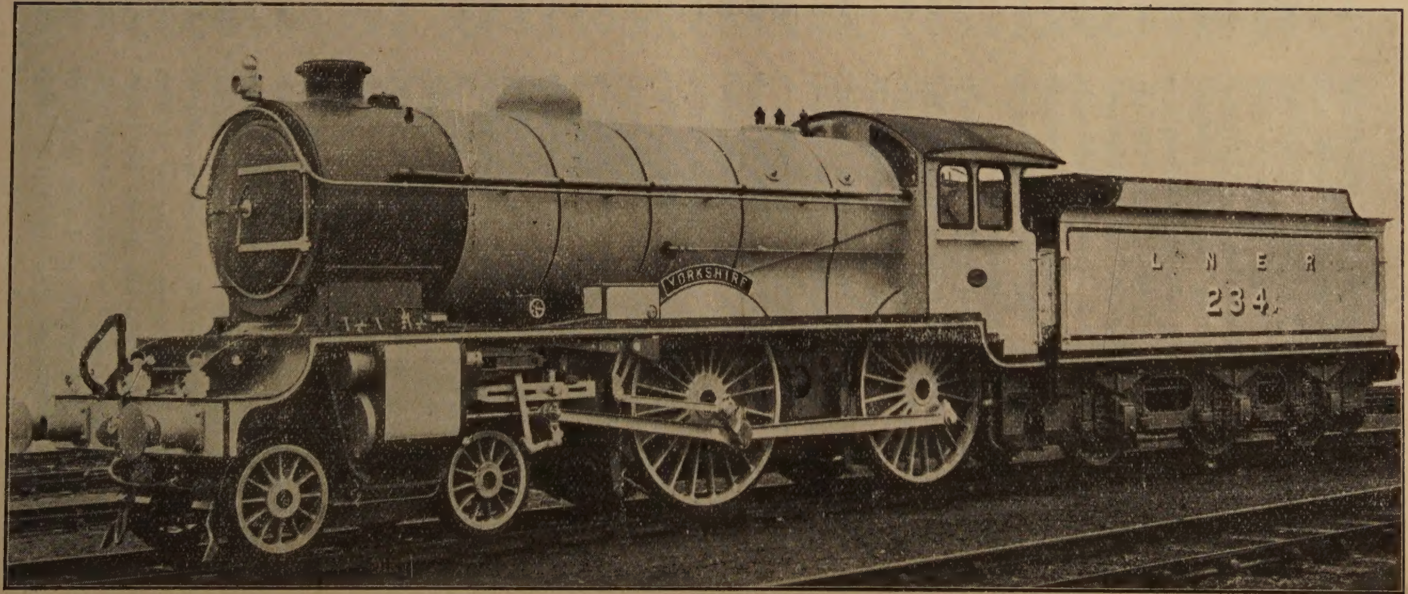


Fig. 3. — Reboilered three-cylinder 4 6-2 locomotive, London & North Eastern Railway.
Mr. H. N. Gresley, Chief Mechanical Engineer.



It has, of course, been necessary to strengthen the boiler and provide heavier barrel plates, and this, together with the alterations to the superheater, has resulted in increasing the total weight by 3 tons 16 cwt. In view of the small hammer blow produced on the rails by three-cylinder engines when running at high speeds, it has been possible to utilise an increased weight on each of the coupled wheels without harm to the permanent way and bridges. The increase of boiler pressure has raised the tractive effort (at 85 % boiler pressure) from 29 835 to 36 465 lb.

The fourth design of the year (fig. 4) is also on the London & North Eastern Railway. It is a three-cylinder non-compound 4-4-0 for intermediate duties, and includes several features of interest. This engine belongs to a new series intended for express passenger traffic other than the heaviest of the main-line trains.

The cylinders are placed in line above the bogie centre, and steam distribution is effected by piston valves actuated by Walschaerts gearing, the motion for the inside valve being taken from the outside mechanism, in accordance with Mr. Gresley's well-known plan, which has been successfully applied to numerous other three-cylinder locomotives of his design. The arrangement is different from that on the *Pacific* and 2-6-0 engines which he has built, as the levers for operating the valves for the centre cylinder are located behind the cylinder instead of in front, thus eliminating the factor of expansion on the valve spindles which has to be taken into consideration when the mechanism for operating the middle valve is located in front of the cylinders. The return cranks of the outside gears are fitted with ball-bearing ends, and the details of the valve motion and other mechanism are similar to those of other London & North Eastern Railway express locomotives designed by Mr. Gresley. The diameter of the piston valve is 8 inches and maximum travel 6 inches at 65 %. cut-off, the steam lap for the outside cylinders being 1 5/8 inch and for the inside cylinder 1 11/16 inch, with exhaust lap nil. The cylinder horse-power is given as 1 403.

The dimensions of the boiler are of an ample character. The centre line is placed at 9 feet above rail level, and the M. L. S. superheater fitted comprises 24 elements giving a heating surface of 246.1 square feet, the total heating surface, including superheater, being 1 643.88 square feet, with grate area 26 square feet and boiler pressure 180 lb. per square inch. The boiler horse-power is 1 056.

The engine in working order weighs 66 tons without tender, of which 42 tons are available for adhesion, the driving pair of wheels supporting 21 tons 5 cwt. The engine develops a tractive effort, at 85 % boiler pressure, of 21 556 lb., and the ratio of adhesion to tractive effort is 4.36.

The equipment of the locomotive includes Ross patent « pop » safety valves, Wakefield mechanical lubricator, M. L. S. superheating apparatus, Westinghouse brake and vacuum ejector, and Davies & Metcalfe exhaust steam injector.

The tender is of the standard London & North Eastern Railway six-wheel pattern, but fitted with disc instead of spoked wheels. The water capacity is 4 200 gallons, and coal capacity 7 1/2 tons. The wheels measure 3 ft. 9 in. diameter on tread distributed over a wheel-base of 13 ft. 6 in. The tender is fitted with water pick-up apparatus, and weighs loaded 52 tons 13 cwt., giving a total for en-

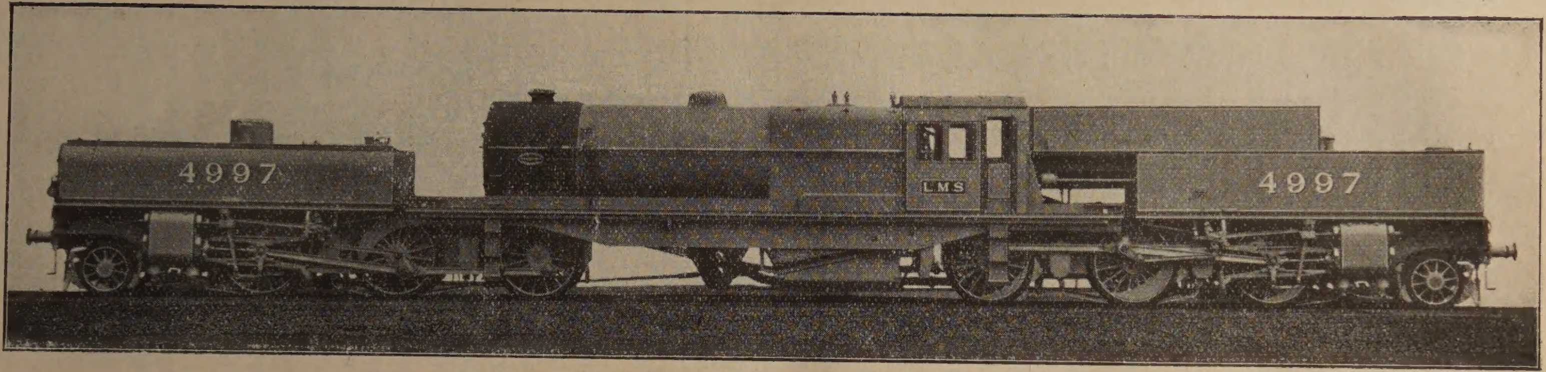


Fig. 5. — 2-6-0 + 0-6-2 *Garratt* locomotive, London Midland & Scottish Railway.

Sir Henry Fowler, K. B. E., Chief Mechanical Engineer.

Built by Beyer, Peacock & Co., Ltd.

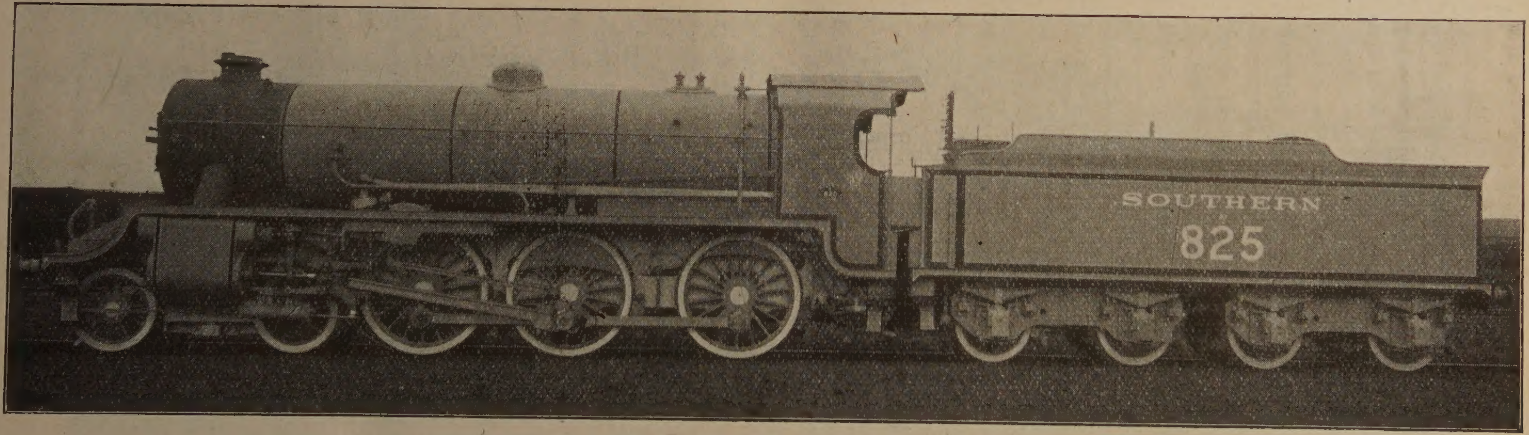


Fig. 6. — 4-6-0 Express goods locomotive, Southern Railway.

Mr. R. E. L. Maunsell, C. B. E., Chief Mechanical Engineer.

gine and tender in working order of 118 tons 13 cwt. Some of the engines are being fitted with Lentz valves.

In previous articles (¹) it has been mentioned that three Garratt engines were being constructed by Beyer, Peacock & Co. Ltd. for the London Midland & Scottish Railway, the only earlier example of the use of this design, so far as the main line railways are concerned, being on the London North Eastern Railway, which has had an engine of the 2-8-0 + 0-8-2 type in service for two or three years. The latter engine is employed on banking duties, whereas the London Midland & Scottish Railway locomotives (fig. 5) are used for working heavy mineral trains on a section of the main line, between Toton (Derbyshire) and London (Brent Sidings), and are the first of their type to be utilised for ordinary traffic working in Great Britain. Their use is, however, not limited to this route, as full advantage has been taken of the wheelbase and axle loading to permit of the engines being worked where required on the London Midland & Scottish System, and in this connection the restricted height from rail level, *i. e.*, 12 ft. 9 in., is to be noted.

The engines have been built by Beyer, Peacock & Co. Ltd., of Manchester, to the requirements of Sir Henry Fowler, Chief Mechanical Engineer of the London Midland & Scottish Railway. They have the 2-6-0 + 0-6-2 wheel arrangement, each group of wheels and cylinder having similar proportions, wheel spacing, etc., as the new 2-6-0 type mixed trafic locomotives on the London Midland & Scottish Railway. The tractive effort, calculated at 85 % of the boiler pressure (190 lb. per square inch), amounts to 45 620 lb. The engine in working order weighs 148 tons 15 cwt., and the maximum load on any one axle is 20 tons 5 cwt.

Water pick-up scoops have been fitted to each tank, these being operated by one screw gear from the cab. The scoops are so arranged that water can be taken up when running in either direction. A large grate area is provided for the boiler, namely 44 1/2 square feet, and to facilitate cleaning the fire drop grates have been provided, these being operated from the cab by means of a hand lever The engine, in spite of its overall wheelbase of 79 feet, operates satisfactorily in either direction, and no special turntables are necessary.

Mention may also be made of a 4-6-0 express goods locomotive designed by Mr. R. E. L. Maunsell, Chief Mechanical Engineer, Southern Railway, and placed in service during the year. These engines constitute a development of a standard class intended for express goods and mixed-traffic service, but have been developed to correspond in general features with the « King Arthur » class of 4-6-0 express passenger engines in respect of the boiler and a number of constructional details and fittings.

II. — **Work**

In regard to train schedules, the principal items of interest relate to the extensions of non-stop runs on the London Midland & Scottish and London & North Eastern Railways. Hitherto, for over twenty years, the Great Western Railway has had the distinction of making the longest non-stop run in the world. At first, this was of 247 miles each way between London and Plymouth, but when the short route via Westbury was com-

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(¹) See *Bulletin of the Railway Congress*, February 1926 number, p. 74, and March 1927 number p. 175.

LEADING DIMENSIONS OF LOCOMOTIVES ILLUSTRATED AND DESCRIBED.

Figure.	RAILWAY.	Type.	Cylinders. Diameter and stroke (inches).	Diameter of coupled wheels.	Heating surface (square feet).			Grate area (square feet).	Steam pressure (lb. per square inch).	Weight (engine only) in working order (tons).
					Tubes.	Fire box.	Super-heater.			
1	Great Western	4-6-0	16 1/4 × 28 (4)	6 ft. 6 in.	2 514 square feet total).			34.3	250	89
2	London Midland & Scottish. . .	4-6-0	18 × 26 (3)	6 ft. 9 in.	1 892	189	445	31.2	250	84.9
3	London & North Eastern	4-6-2	20 × 26 (3)	6 ft. 8 in.	2 522	215	706	41.3	220	96
4	— — —	4-4-0	17 × 26 (3)	6 ft. 8 in.	1 226	171.5	246	26	180	66
5	London Midland & Scottich. . .	2-6-0+ 0-6-2	18 1/2 × 26 (4)	5 ft. 3 in.	1 954	183	500	44.5	190	148 3/4
6	Southern	4-6-0	20 1/2 × 28	5 ft. 7 in.	1 716	162	337	28	200	80 3/4

pleted this became 225.7 miles, and has remained at this figure ever since. With the introduction of the « King » class locomotives (fig. 1), the odd 7 minutes were cut off the time, so that the allowance is now 240 minutes, while the average speed becomes 55.8 miles per hour, though the greater part of the journey must be covered at substantially the mile-a-minute rate to keep time. Similarly, one of the 3-hour non-stops between London and Exeter has been reduced to 175 minutes for 173.7 miles.

The Plymouth run is still the *fastest* booked non-stop for over 200 miles, but in the summer was exceeded *in length* by two new schedules on other lines. One of these was the timing of the London Midland & Scottish Railway 10 a.m. Anglo-Scottish express from Euston to call first at Carnforth, 236 miles, booked in 265 minutes, average 53.4 miles per hour. The call at Carnforth was to change engines only, and as no stop was made at Carlisle and the train stopped at Symington only to divide the Edinburgh and Glasgow portions, the public timetables suggested that the train ran throughout without intermediate stop. Indeed, some of the newspapers claimed that this was actually being done or to be done.

Meanwhile the London & North Eastern Railway scheduled the summer advance portion of the « Flying Scotsman » to run non-stop from London (King's Cross) to Newcastle, 268.3 miles, but as associated trains could not be altered, the train was not accelerated, so that the allowance of 330 minutes produced an average of 48.8 miles per hour only. At least half of the journey required, however, to be made at a considerably higher average, so that the run has to be appreciated at a higher level than is suggested by its apparently mediocre average booking. The run was made on Mondays, Thursdays, Fridays and Saturdays, and in the down direction only.

At the end of the summer season, however, the new « Royal Scot » locomotives (fig. 2) then being available, the London Midland & Scottish Railway altered the 10 a.m. up and down Anglo-Scottish expresses between Euston and Glasgow and Edinbugh to run non-stop between London and Carlisle (299 1/4 miles) instead of between London and Carnforth (236 miles), so that this run, which continues to be made through the winter, now ranks as the longest non-stop run in the world, though the Great Western run maintains its pestige in regard to speed. The Carlisle times are not publicly scheduled, so that the trains concerned continue to appear in the time-tables as non-stops between Euston and Glasgow and Edinburgh, though, actually, calls are made at Carlisle to change engines and at Symington to divide the Edinburgh and Glasgow portions.

A few records of runs timed by the writer may now be given. The first was with a « King » class engine (fig. 1) between Paddington and Plymouth, with a summer loading but before the time was reduced to 4 hours. No. 6005, *King George II*, had a load of 360 tons to take through to Plymouth and a further 75 tons to slip at Westbury. This meant that, with passengers and luggage, about 360 tons had to be worked over the terrific gradients beyond Newton Abbot, and that for the first 95 1/2 miles the load was about 435 tons. The start was taken fairly easily, and the 36 miles to Reading (slack for junction) took 37.9 minutes. Thence to Newbury, 17.1 miles, occupied exactly 20 minutes, this being a climbing stage, and the remaining 17 miles to Savernake (the summit of this stage) were run in 18 minutes. Thence to Westbury (slack for curves and detachment of slip coaches) the 25.5 miles took 22.8 minutes, the slack being very carefully observed. The next 5.7 miles to Frome (another slack for curves, etc.) took 7.8 minutes, and the following undulating stage of 41.6 miles to Taunton was run in 41.8 minutes.

Then follows a difficult climbing stage to Whiteball tunnel, but the 9.8 miles were covered in 10.6 minutes, and the following easy 21 miles down to Exeter (severe slack approaching and through station) were run in 19.8 minutes. Thence to Newton Abbot (an easy stage, but curves, etc., require careful running) the 20.2 miles took 22.7 minutes, and the 193.9 miles from the start had been covered in 201.3 minutes against 203 minutes booked. Then commences a very hard section which includes adverse gradients at 1 in 57, 41, 36, 46 and the like, some short, but in several instances aggregating as much as 2 miles at these formidable inclines, so steep, indeed, that, even on the downward sides of the « gables » shown by the gradient profile, the train had to be held in. Space cannot be given for detailed description, but notwithstanding these gradients and the fact that the load was about 360 tons actual, the 31.8 miles to North Road, Plymouth, were run in 44.3 minutes, the termination being a slow passage of the Plymouth area, and the arrival being over 1 minute early so that the run of 225.7 miles had been completed in 245.7 minutes against 247 allowed. At no stage was there the slightest suggestion that the engine had any difficulty in meeting requirements, and throughout the journey speed was relatively moderate, 75 miles per hour being the highest, except for one or two slight touches approaching the 80 rate.

The London & North Eastern Railway run to Newcastle non-stop was made behind 4-6-2 engine No. 4474, *Victor Wild*, with a load of 350 tons. Weather was unfavourable at the start, and speed was distinctly mediocre through the steeply graded tunnel section, no less than 7.1 minutes being taken for the 2.6 miles to Finsbury Park. There was also a bad permanent way slack at New Southgate, so that the 12.7 miles to the summit at Potters Bar took 22 minutes. Onwards, however, the running was very good indeed, and the 63.7 miles to Peterborough were run in 67.6 minutes. Regaining speed after the usual heavy slack there, the 23.7 miles to Stoke Summit took 29.7 minutes, and Grantham was passed in 124.9 minutes from London (105.5 miles). Thence to Doncaster the 50.5 miles were run in 60.4 minutes, while the 32 miles to York occupied 42.1 minutes. A distance of 188 miles had thus been run in 227.6 minutes.

The passage of York station was a very slow one, while the easy schedule given to the train necessitated a degree of spinning-out time, especially as on the day in question it was given an additional 7 minutes to Newcastle in consequence of additional trains in service. The 44.1 miles to Darlington thus took 57.5 minutes and the remaining 36 miles (which include several speed restrictions), 49.3 minutes, so that the arrival at Newcastle, after 5 hours 34.4 minutes' continuous running (for 268.3 miles) was 2.6 minutes early according to the schedule in force that day, though 4.4 minutes over the times to which the train ordinarily ran. The outstanding interest of the run is, of course, its great length, covered without a single check other than the usual speed orders which have to be observed, though it was quite evident that the engines could take a considerably increased load on the same schedule, and could improve very materially (with a greater load) upon the time schedule, which is, unfortunately, governed by the running of other trains until such time as a complete rearrangement is desirable and can be made.

The writer did not travel on the London Midland & Scottish non-stop train when engines were changed at Carnforth, but made the journey a few days after non-stop working to Carlisle had been inaugurated, the engine being one of the new « Royal Scot » class (fig. 2) No. 6109. The train consisted of new rolling-stock introduced for this service earlier in the year, and as names have been given to a number of the principal London Midland & Scottish expresses, was that known as « The Royal Scot », leaving Euston at 10 a. m. and Glasgow and Edinburgh at the same time in the opposite direction. The load was the standard 415 tons empty, or with passengers and luggage about 440 tons.

A good climb was made to Chalk Farm, and the gradually rising 31.7 miles to Tring were covered easily in 41 minutes. Thence to Bletchley the 15 miles were run in 13.8 minutes, and the next 35.9 miles to passing Rugby at reduced speed in 36.9 minutes. Thence to Stafford the 51 miles took 54.3 minutes, and Crewe was passed at reduced speed 27.5 minutes later (24.5 miles). The 158.1 miles from London had thus been covered in 173.5 minutes.

The 50.9 miles thence to Preston, the next station requiring a severe speed reduction and careful running, occupied 57.4 minutes, and the increasingly difficult 27 miles to Carnforth were covered in 31.4 minutes. To this point, the termination of non-stop running from London during the summer, 262.5 minutes had been taken for 236 miles. When Carnforth was the termination the time to this point was 265 minutes, though it was often done in less time. As a rule, however, two engines, a 4-4-0 and a 4-6-0, were employed, whereas one 4-6-0 engine only, though of a much more powerful class, is now used throughout.

Passing Carnforth at about 60 miles per hour the increasingly difficult 26.2 miles to passing Tebay were run in 38.5 minutes, the engine taking things comparatively easily, and the 5.6 miles (including 4 miles at 1 in 75) to Shap Summit took 11.9 minutes, again with very great ease as nothing exceptional was being attempted. Thence an easy run down for 31.3 miles (32.4 minutes with a slow run in) brought us to Carlisle, 299.1 miles having been covered without intermediate stop and without any check whatever, except for speed orders at several places, in 344.5 minutes. This time has been improved upon substantially on a number of occasions and for test purposes the load has been considerably increased, but the outstanding feature of the run was the comparative ease with which the engine was operated throughout, and especially on the steep sections.

Passengers are not taken up or put down at Carlisle, but engines are changed, and with No. 6128, of the same class, and with the load unaltered, the undulating 39.7 miles to Beattock were covered in 44.4 minutes and the steep climb of 10 miles to Beattock Summit (almost continuously at 1 in 70 or 75) occupied 19.8 minutes, though the length of the ascent necessarily involved a very much harder task than the ascent of the Shap incline. The remaining 17.2 miles to Symington were completed in 19.7 minutes. Here the Edinburgh portion was detached, so that No. 6128 had only about 250 tons to work to Glasgow. This is a complicated route, with numerous speed orders, and, as a rule, the Glasgow suburban area is traversed at moderate speed only. Hence, the 35.4 miles took 52 minutes, though even then the train arrived 8 minutes before the time publicly advertised.

A few notes may be given in regard to other interesting records, though on standard schedules, which have come under the writer's notice. On the Great Western Railway a « Castle » class 4-6-0 No. 4093, *Dunster Castle,* had 180 tons over the very hard Plymouth-Newton Abbot section (31.8 miles in 46.9 minutes start to stop); 240 tons onwards to Exeter (20.2 miles in 27.4 minutes, including checks); the same load to Taunton (30.8 miles in 38 minutes, again with checks); and 330 tons thence to London. On this stage the 41.6 miles to the usual slack for Frome took 43 minutes, the 5.7 miles to the second slack at Westbury 8 minutes, the more or less difficult 25.5 miles to passing Savernake 27.5 minutes; the fairly easy 34.1 miles thence to Reading (two intermediate checks and slack at the latter station) 33.9 minutes; and the final 36 miles to London, with an easy run in, 39 minutes. On the South Wales main line an earlier four-cylinder 4-6-0, No. 4019, *Knight Templar,* with 330 tons, ran from Paddington to Reading, start to stop, 36 miles, in 41.6 minutes; thence to passing Didcot, where two coaches were slipped, reducing the load to 270 tons, the 17.3 miles took 19 minutes; and Badminton (46.7 miles) was passed 47.3 minutes later. The remaining 33.5 miles to Newport, including the passage of the Severn tunnel, are complicated by many speed restrictions, but were completed in 37.9 minutes. Returning, a similar engine, No. 4059, *Princess Patricia,* with 350 tons, took 49.1 minutes to pass Badminton (33.5 miles), and completed the exact 100 miles thence to a stop outside the London terminus in 98 minutes, including one slight relaying slack. Incidentally, the Swindon-London stage of 77.3 miles, on which the fastest schedule on British railways is made by a start to stop train in 75 minutes, was covered by this South Wales express in 73.4 minutes, though passing Swindon at speed. During the year a special train from Swindon covered the run, start to stop in 68.5 minutes, the engine by which it was drawn being a new « King » class locomotive.

On the London & North Eastern Railway the most interesting run was on the London - Harrogate-Edinburgh Pullman car express, now named « Queen of Scots ». This was further interesting in that the engine was 4-4-2 No. 4419, which is fitted with a « booster » to give assistance on steeply-graded stages. The load was 280 tons and the weather fair. The difficult 12.7 miles to passing Potters Bar took 18.5 minutes; thence to the Peterborough slack the 63.7 miles occupied 60.6 minutes, with one intermediate permanent way check, so that the first 76.4 miles had been covered in 79.1 minutes. The difficult 23.7 miles to Stoke box took 29.1 minutes (100 miles from London in 108.2 minutes), and the 55.9 miles thence to passing Doncaster (a bad check approaching) 55.9 minutes, so that the 156 miles from London had been covered in 164.1 minutes. The remaining 42 miles to Harrogate, the first stop, are too complicated for fast running, but were run in 62.2 minutes, so that the complete run of 198 miles had taken 226.3 minutes.

On the London Midland & Scottish Railway two runs on the Birmingham services may be mentioned. A three-cylinder compound 4-4-0 No. 1167, with 200 tons, passed Tring (31.7 miles) in 35.6 minutes, and completed the 50.9 miles to passing Rugby in 50.4 minutes. The remaining 30.3 miles to Birmingham took 34.1 minutes, so that the complete run of 113 miles had been covered in 120.1 minutes. Returning, a similar engine, No. 1053, with 180 tons, passed Rugby in 28.9 minutes, and Bletchley (bad check) 32.9 minutes later (35.9 miles). Thence to Tring the 15 miles took 15.3 minutes, and the 26.2 miles to a stop at Willesden Junction took 29.1 minutes, including two checks. After stopping for about two minutes, and spending 9.7 minutes on the last 5 miles, Euston was reached in 2.9 minutes under the 120 minutes allowed to complete 113 miles, one stop, two checks, and one usual slack included.

On the Midland Manchester-London route a new three-cylinder compound 4-4-0, No. 925, over the very difficult Peak route, and with 320 tons from Millers Dale, took 15.1 minutes for the 14 miles from that station to Matlock, 23.7 minutes for the 17.3 miles to Derby and 37 minutes for the 29.5 miles to Leicester. An older engine of the same class, No. 1041, with an ordinary 4-4-0, No. 559, as pilot, took 33.4 minutes for the 27.1 miles to passing Kettering, 22.9 minutes thence to Bedford (22.2 miles), and 21.4 minutes for the further 19.6 miles to a stop at Luton. The remaining 30.2 miles to London (St. Pancras) were completed in 34.5 minutes.

On the Southern Railway principal interest attaches to a double journey between London (Waterloo) and Exeter. The engines concerned on the down journey were of the now famous « King Arthur » class, 4-6-0. With 270 tons, No. 775, *Sir Agravaine*, passed Woking (24.4 miles) in 29 minutes from the start, and covered the next 23.5 miles to Basingstoke in 23.1 minutes. Thence to Andover (18.5 miles) took 18 minutes, and the final 17.4 miles to Salisbury occupied 17.9 minutes, so that 88 minutes had been taken for the complete run of 83.8 miles. Continuing, No. 448, *Sir Tristram*, was badly checked near Templecombe, but took 34.6 minutes for this length of 28.2 miles. The 32.3 miles to Axminster occupied 30.4 minutes, and up the long bank to Honiton tunnel very good work was done, the 9.5 miles to the Summit taking 10.5 minutes. Thence to Pinhoe the 15.8 miles were run in 15.2 minutes, but including delays onwards to Exeter, with those mentioned above, the complete time for the 88 miles from Salisbury to Exeter was barely 97 minutes, over a very hard route. Returning, with 250 tons, an older 4-6-0, No. 747, covered the 18 miles to the summit of Honiton bank in 25.6 minutes, including a permanent way check, and the remaining 31.3 miles to Yeovil Junction, the first stop, were run in 31.4 minutes. Calls were then made at Sherborne and Templecombe, the 28.2 miles thence to Salisbury taking 36 minutes, with several bad delays. Another « King Arthur » 4-6-0, No. 454, *Queen Guinevere*, with 290 tons, completed the journey to London, but, because of stops and checks, the times do not possess any special interest.

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The regulation of hours of duty of the employees in the Operating Departments of the Swiss Federal Railways

(A study of a code of laws),

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The Federal law dealing with the hours of duty on railways and other communication and transport undertakings was voted by the Swiss Federal Council on the 6 March 1920. An administrative order putting this law into operation, together with regulations dealing with the application thereof, were soon after issued. Switzerland in this way has obtained definite legislation dealing with the application of the eight-hour day in the transportation and communications world.

Scope of the act.

The Federal law applies to the following :

1. The Swiss Federal Railways;
2. The Postal Administration;
3. The Telephone and Telegraph Administration;
4. Transportation and communication concerns under concession from the Swiss Federation.

The Federal Council is also authorised to extend the law to ancillary services which form a necessary, or at least a desirable complement to one of the above-mentioned undertakings.

The law is applicable to permanently employed persons who spend most of their time in the active service of one of the above-mentioned undertakings and are held to a strictly personal service.

Persons employed on new works or on supplementary works are not subject to the law unless they have to look after the safety of the traffic.

The order putting the law into force regulates in detail its application and that of certain of its requirements to persons who, although performing exclusively personal service, are not permanently employed and do not devote the greater part of their time in one of the undertakings covered by the law in question.

The orders also apply to :

1. The Swiss Federal Railways;
2. Railways and navigations undertakings under concession from the Swiss Confederation;
3. Among the ancillary services :
   - sleeping car and dining car services.

From a legal point of view, electric tramways, funicular railways and aerial railways under concession from the Federation, are included under the Act.

Legally the operating department includes the following services :

1. *On the railways* :

a) maintenance and inspection of the track;

b) station working, including that of goods sheds;

c) train working;

d) locomotive running, including workshops, running sheds, accumulator charging depots, electric power stations and sub-stations, in so far as these are not governed by the Federal Factories Act which remains in force;

e) distribution of electricity.

2. *On the waterways* :

a) landing stage working;

b) running;

c) operation and maintenance of machinery, including that in the repair yards, in so far as these also are not covered by the Federal Factory Act.

3. *In the sleeping car and dining car services* :

a) Working of stations, including depots and workshops, in so far as they are not covered as above by the Federal Factory Act;

b) sleeping car and dining car operating staff, so far as concerns employees whose duties are mainly carried out on Swiss territory.

All persons permanently employed in the operating departments of transportation and communication undertakings, or by the above-mentioned ancillary services, are subject to the provisions of the law so long as they are employed in the operating departments enumerated above.

The law also applies to contractors' employees while they are employed, as for example, on repairs to the track, in the goods department, in the warehouses, etc. On the other hand, any work on the permanent way which has no bearing on the safe working of trains and which is let out to contract, as for example, re-laying of lines which are out of service, the preparation of ballast, repairs to buildings, laying of water pipes, painting bridges, cutting hedges, clearing ditches, removing snow, building protections against avalanches, etc., are not considered as forming part of the operating services. Contractors' employees are not therefore bound by the terms of the law unless in their work they have to take into account the movement of trains.

Employees in the principal departments, whether at headquarters, as the permanent way, traffic, motive power, and electrical sections, or at divisional headquarters, as works section and the operating section with its station, train and shed office staffs, are not subject to the terms of the law in question.

The new works office and the divisional engineers, as well as the offices of the principal workshops, are not subject to the law in question.

Working day.

The *working day*, under the terms of the Federal law, consists of a *turn of duty* and a *period of rest*.

The *turn of duty* is the time between the commencement of duty after a period of rest and the next period of rest; it is made up of :

1. *hours of work* and
2. *breaks*.

Hours of work.

The daily working period *ought not to exceed 8 hours* on an average *over a period of 14 days* at most taken consecutively or separated by single days of rest.

The average working period may be extended to *9 hours* for duties consisting mainly of simply being present on duty, these duties being the following :

1. *On railways* :

a) maintenance and inspection of the track :

— supervision of the line;

b) station working :

- all duties ;

c) train working :

- men standing by in reserve,
- rack railway train working,
- funicular railway train working ;

d) motive power department, including workshops, running sheds, accumulator charging depots, electric power stations and sub-stations, in so far as these are not regulated by the Federal Factories Act :

- men standing by in reserve,
- auxiliary services at sheds (1) such as pre-heating trains (2),
- inspection,
- equipping and cleaning rolling stock,
- charging accumulators,
- electric power stations and sub-stations,
- motive power department of rack railways,
- motive power department of funicular railways ;

e) distribution of electricity.

2. *On the waterways :*

a) landing stage working,

b) running,

c) operation and maintenance of machinery, including that in repair yards, in so far as these are not regulated by the Federal Factories Act :

- men standing in reserve,
- auxiliary or accessory services to the working of the depots.

3. *In the case of sleeping and dining car services :*

a) station duties, carriage sheds and workshops included, in so far as these are not regulated by the Federal Factories Act :

- collectors,
- stores,
- equipping and cleaning rolling stock,

b) duty on these carriages so far as concerns employees whose duties are mainly carried out on Swiss territory.

Presence on duty, within the meaning of the said act, may be defined as the time during which an employee is not required to carry out any actual work, but during which he is obliged to remain on duty at his post and ready to immediately carry out any work which may offer.

The duties for which the average working day may be extended to 9 hours within the limits allowed by the law are decided by the Federal Railway Administration. The staff has, in any case, to be consulted beforehand. In case of differences between the undertaking and the staff concerned, the decision of the Federal Railway Department is final.

The hours of duty, including compensation for time off, *ought not to exceed 10 hours* in one turn of duty. It is not necessary to grant equivalent *time off* when an employee consents to be *paid* for overtime work done in excess of the ordinary average hours. The overtime rate is to be calculated on the *rate of pay or salary increased by at least 25 %*. An employee can only be allowed not to take equivalent time off to the extent of 150 hours per civil year.

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(1) Under « auxiliary work at sheds » mentioned above are included, pointsmen, men in charge of turntables and traversers, bath-house attendants, messengers and storekeepers.

(2) By « pre-heating trains » is meant the duty performed by the staff on engines and heating wagons when it is solely a question of heating not provided by the trains engines when getting them ready not previously done by steam when examining the heating equipment of carriages.

When the maximum hours of duty fixed by the law are *exceeded* by more than *a quarter of an hour* in consequence of the late running of trains or boats, or by other unavoidable circumstances, equivalent time off should be given for such additional hours during the *following three working days*.

The hours of duty is the period during which the staff is occupied on the business of the administration, including that given to subsidiary duties. The time the employee takes during working hours to go on foot or otherwise from one place to another is included in this period.

Half the time taken by an employee to travel as a passenger to and from his place of employment is counted as duty.

The staff should be free to use the rest of their time as they wish, except when the administration has to carry on the service under unforeseen circumstances.

Transportation administrations when having to deal with *heavy seasonal traffic* may, by agreement with the staff, *extend the daily hours of duty by one hour during five months* of the year as a *maximum*, on condition that corresponding time off is allowed during the remainder of the year.

Additional work which may from time to time occur at intervals as the result of trains or boats running late, or other reasons ought to be made up by time off so that the ordinary average hours of duty calculated for the periods provided for in the allocation of duties (*periods of time off*) may not be exceeded. In cases where time off cannot be arranged within the stipulated period, or if it can only be partially granted, such additional work shall be paid for as overtime.

The additional hours of duty during any one month to be paid for as overtime are to be added together. The fractions of 30 minutes or less count as half an hour, those of more than 30 minutes as a whole hour.

The pay per hour shall be at the hourly rate of pay or salary increased by 25 %.

For staff on an annual salary, the pay per hour is calculated on the basis of 300 days of either 8 or 9 hours, and for staff employed by the day, on the basis of either 8 or 9 hours par day (see table I).

The time off provided for by the Federal law in cases where the maximum legal working hours are exceeded is so arranged that the working hours of the day in question and of the three following days shall not exceed 10 hours on the average.

In permanent way maintenance, upkeep of telegraph and telephone lines and electric power lines, and also of bridges, the working hours may be extended or curtailed during certain days, in accordance with the exigencies of the work to be carried out taking into account the train timetable, and as far as possible the wishes of the staff concerned, provided, however, that the average of 8 hours for a period of 14 days laid down by the law is not exceeded.

The average working day of employees acting as relief men or when lent to another department is that in force in that department. For example, platelayers, acting as level-crossing keepers, pointsmen, goodsyard men, etc., who work a 9 hour day will also work a 9 hour day.

On the railways and inland navigation services, as well as on the sleeping cars and dining cars mentioned above, every employee should be fully occupied for 8 hours, that is to say, the total of his daily work, divided between different places if necessary, ought to actually shew 8 hours of effective work.

If, however the work consists mainly in standing by, the daily turn of duty may be increased to 9 hours after previously con-

TABLE I.

Table for calculating the pay for overtime.

Scale A. — Average working period : 8 hours.				**Scale B.** — Average working period : more than 8 hours.			
Total annual pay.	*Pay per hour overtime.*	*Total annual pay.*	*Pay per hour overtime.*	*Total annual pay.*	*Pay per hour overtime.*	*Total annual pay.*	*Pay per hour overtime.*
Francs.	Fr. C.	Francs.	Fr. C.	Francs.	Fr. C.	Francs.	Fr. C.
2 400 to 2 515	1.30	6 356 to 6 547	3.40	2 400 to 2 613	1.20	6 934 to 7 149	3.30
2 516 to 2 707	1.40	6 548 to 6 739	3.50	2 614 to 2 829	1.30	7 150 to 7 365	3.40
2 708 to 2 899	1.50	6 740 to 6 931	3.60	2 830 to 3 045	1.40	7 366 to 7 581	3.50
2 900 to 3 091	1.60	6 932 to 7 123	3.70	3 046 to 3 261	1.50	7 582 to 7 797	3.60
3 092 to 3 283	1.70	7 124 to 7 315	3.80	3 262 to 3 477	1.60	7 798 to 8 013	3.70
3 284 to 3 475	1.80	7 316 to 7 507	3.90	3 478 to 3 693	1.70	8 014 to 8 229	3.80
3 476 to 3 667	1.90	7 508 to 7 699	4.00	3 694 to 3 909	1.80	8 230 to 8 445	3.90
3 668 to 3 859	2.00	7 700 to 7 891	4.10	3 910 to 4 125	1.90	8 446 to 8 661	4.00
3 860 to 4 051	2.10	7 892 to 8 083	4.20	4 126 to 4 341	2.00	8 662 to 8 877	4.10
4 052 to 4 243	2.20	8 084 to 8 275	4.30	4 342 to 4 557	2.10	8 878 to 9 093	4.20
4 244 to 4 435	2.30	8 276 to 8 467	4.40	4 558 to 4 773	2.20	9 094 to 9 309	4.30
4 436 to 4 627	2.40	8 468 to 8 659	4.50	4 774 to 4 989	2.30	9 310 to 9 525	4.40
4 628 to 4 819	2.50	8 660 to 8 851	4.60	4 990 to 5 205	2.40	9 526 to 9 741	4.50
4 820 to 5 011	2.60	8 852 to 9 043	4.70	5 206 to 5 421	2.50	9 742 to 9 957	4.60
5 012 to 5 203	2.70	9 044 to 9 235	4.80	5 422 to 5 637	2.60	9 958 to 10 173	4.70
5 204 to 5 395	2.80	9 236 to 9 427	4.90	5 638 to 5 853	2.70	10 174 to 10 389	4.80
5 396 to 5 587	2.90	9 428 to 9 619	5.00	5 854 to 6 069	2.80	10 390 to 10 605	4.90
5 588 to 5 779	3.00	9 620 to 9 811	5.10	6 070 to 6 285	2.90	10 606 to 10 821	5.00
5 780 to 5 971	3.10	9 812 to 10 003	5.20	6 286 to 6 501	3.00	and so on.	
5 972 to 6 163	3.20	and so on.		6 502 to 6 717	3.10		
6 164 to 6 355	3.30			6 718 to 6 933	3.20		

Note.

The respective total pay includes, in addition to the total annual wages properly speaking, the principal allowan for the increased cost of living, and in the case of the train crews, the fixed supplementary allowances. For staff on monthly salary, the annual salary is taken as this multiplied by 12, and for staff paid by the day, the daily pay multipli by 365 or by 310, according to whether wages are also paid for days of rest or only the days of actual work.

sulting the staff concerned in accordance with the conditions mentioned above.

Each particular case is examined as to how far the periods of standing by on duty included in each turn of duty justify the extension of the working hours in conformity with the law.

In these cases the average working hours are calculated in the following manner :

When a turn of duty includes the total of more than one hour of standby duty, half the time of such standby is deducted, with this restriction, however, that the reduction may not exceed 60 minutes per working day. If, for example, a working period of 535 minutes includes 90 minutes of standby duty, the equivalent time to be taken off is booked as $535 - \frac{90}{2} = 490$ minutes. If, in one day, train crews have 4 hours on actual train service and 4 hours in reserve, the time is booked as 7 hours of work for the day in question. The average turn of duty calculated with these reductions should not in any case exceed 8 hours per day.

If we examine each case separately, it will be seen that circumstances are not the same for all the various turns of duty of employees of the same grade at any station. If, for example, the working conditions allow the average time on duty of pointsmen to exceed 8 hours at portions of the station where the traffic is light, at other signalboxes in the same station the average hours on duty will not exceed 8 hours.

In order to determine what should be considered as a simple presence on duty, we take as a basis a statement of the normal duties. If a permanent change in the conditions has occurred — a turn of duty which formerly included periods of standby duty and which by reason of the increase in traffic now consists of continuous work — the rosters should be rearranged. If an extension of the hours of duty are advantageous, this may be also arranged when periods of standby duty arise, for example, as the result of the traffic falling off, in turns of duty which formerly consisted of continuous work.

To calculate the time necessary to carry out the work at unimportant stations where there are not more than five men employed, the following times are adopted:

- through trains : 5 minutes;
- stopping trains : 8 minutes;
- goods trains : according to requirements;
- issuing tickets : half a minute per ticket;
- issuing season tickets : 3 minutes per ticket;
- booking in or out left luggage : 3 minutes per entry in or out;
- forwarding luggage and express parcels : 3 minutes per consignment;
- reception of express parcels : 2 minutes per consignment;
- telegrams : 6 minutes each;
- advice S. M. : 2 minutes each;
- wagons, dispatched and arrival : 2 minutes per wagon;
- dispatch and arrival of cattle : 8 minutes;
- goods, dispatch and arrival : 7 minutes;
- accounts in connection with passenger and parcel traffic : 15 minutes basis time, plus 1/5 minute per ticket, season ticket and consignment of luggage;
- accounts in connection with cattle and goods traffic : 20 minutes basis time, plus 2/5 minute per consignment;
- miscellaneous ; 30 to 45 minutes.

Work due to special circumstances should be allowed for in accordance with the time taken.

To determine the average working hours which should be worked by gatekeepers, this is reckoned at 6 minutes per train. The remainder of the time they are considered as merely being present on duty. Additional and special trains are dealt with in the same way.

The time allowed to train crews before and after the time of arrival and departure is arranged to suit requirements and local conditions, based on a normal amount of work. Generally speaking the following times are allowed:

A. — *Taking charge of the trains.*

	Time allowed.
1. *a*) Stopping trains with few pairs of wheels, for all the members of the train crew	12 to 15 minutes.
b) Through and stopping trains, with a large number of pairs of wheels, for all the members of the train crew.	15 to 20 —
2 *a*) Freight trains with few pairs of wheels :	
aa) for the head guard and the clerk attending to the records	15 to 20 —
bb) for the other members ot the train crew	10 to 15 —
b) Freight trains with a large number of pairs of wheels :	
aa) for the head guards	30 to 40 —
bb) for the clerk attending to the records	30 to 35 —
cc) for the other members of the train crew	15 to 20 —
3. For the staff proceeding as passenger to another station or goods yard or returning to their station or goods yard	5 —

B. — *Handing over the trains.*

For each employee	5 to 10 —

C. — *Journeys made to and from shunting yards.*

The journeys which train crews make, either on foot or otherwise, to reach a shunting yard or to return, are not counted in the working hours if they occur before booking on, before or after a break or after leaving duty. In cases where duties finish before a break in a passenger station and have to be resumed after this break at a shunting yard, or *vice-versa*, a break should not be less than 30 minutes. When, for example, an employee has to obtain signal lamps from the lamp room at the passenger station or to take them back again, the time necessary for one employee alone to do it is counted as duty time. It is therefore necessary at each station to make arrangements according to circumstances.

The journeys an employee makes without having any duty to do from or to his home are counted at half rate as working time, even if under exceptional circumstances the said employee who is travelling as a passenger is occasionally called upon to give assistance in some duty. When he is regularly required to assist, the time taken is counted at full rate in reckoning the hours of duty.

Journeys as passengers are also counted as working hours at half rate when an employee makes such journeys in the course of his turn of duty to proceed from his normal post to another place of employment, or *vice-versa*.

Moreover, journeys made during working hours between two places of employment which are both situated away from the employee's home station are reckoned as working hours at the full rate. When an employee has to work in turn on various sections of the line and frequently changes his place of employment and therefore temporarily lives at some central position, this latter place is considered as his home station.

For employees of the permanent way department, each ganger's length is considered as the home station. Journeys to work are not taken into consideration in calculating the working hours, except when an employee works outside the length to which he is attached. For all the employees under a chief ganger, the point of departure taken in reckoning the time of these journeys is the station which is closest to the middle of the length. Journeys made between the home station and the place of employment at the beginning or end of work in the morning and afternoon are not counted in the working hours. The working hours which may be lost as a result of the late running of trains during journeys to the place of employment are compensated for.

In fixing the hours for commencing and finishing a day's work, the timings of suitable trains are to be taken into account as far as possible.

In the case of work in tunnels, the time occupied by all the employees in proceeding from the entrance of a tunnel to the place of employment and *vice-versa* is included in the hours of work, except the time allowed for a meal taken in or outside the tunnel.

When the hours of duty as arranged are less than the legal hours, the difference is in the first place subtracted from the additional hours of work for the period of compensation in question.

To determine whether the various additional periods of one quarter of an hour or less amount to 1 1/2 hours over a period of 14 days, these are added up for the preceding fortnight on the 15th and last day of each month. If the total figure thus obtained does not exceed 1 1/2 hours, it is not included for the period under consideration,

Breaks.

The staff are allowed a break of 1 hour at least about the middle of the turn of duty, when the men ought to return to their homes if the service allow it.

This break may be omitted if the turn of duty does not exceed 8 hours and if it is possible for the staff to take a meal while working.

The breaks should be fixed so as to allow the staff to take their meal at convenient times and at home if possible.

In general, the breaks should be for at least 20 minutes; breaks of at least 15 minutes may be allowed under special circumstances.

For men supervising the line, breaks of 15 minutes may in some cases be allowed in the interval of 30 minutes between two trains on condition that the employees have no other duties to carry out in the course of these 30 minutes, as for example, working the block instruments, recording time signals, etc.

As far as the exigencies of the service allow the heads of departments should avoid fixing continuous turns of duty exceeding 6 hours and allowing more than 3 breaks in any one turn of duty.

Not more than 3 breaks should be arranged unless absolutely necessary or where this allows a more efficient use of the staff.

In arranging working hours, the distance between the place of employment and the employee's home should be taken into consideration, as far as possible, in accordance with local conditions.

Breaks should be avoided between 11.0 p. m. and 5.0 a. m. In any case, not more than one break should be arranged during these hours of the night without the consent of the staff.

Nine hours of continuous work may not be arranged with the consent of the staff unless such work consists mainly of stand by duty and unless it is possible for the employees to get their meals.

Except in the case where the turn of duty does not exceed 8 or 9 hours, there should not be more than six hours continuous work except where circumstances demand it, as for example, on through trains or on stopping freight trains, etc.

Turns of duty.

The daily duration of a turn of duty should not exceed 13 hours on the average over a period of 14 days as a maximum, either consecutive or separated by single days of rest, or 13 1/2 hours if the employee has a house provided by the railway close to his place of employment. This period should be reduced to 12 hours on the average when the conditions of work allow it.

The maximum length of a turn of duty, including time worked as compensation, is 14 hours.

Under special circumstances fixed in accordance with the regulations, the turn of duty may be extended to 15 hours, provided that the average over 3 consecutive days does not exceed the normal average of 13 hours or of 13 1/2 hours as mentioned above.

When the maximum duration of the turn of duty as fixed by law is exceeded by more than a quarter of an hour by reason of the late running of trains or boats, or by other unavoidable circumstances, the additional time should be compensated by time off in the course of the 3 following working days.

If the time off laid down by law is given, the duration of the turn of duty may be extended by regulation to 15 hours as a maximum :

1. in cases in which the timetables make it necessary;

2. in cases where it avoids having to lodge the staff;

3. in cases of absence of certain employees by reason of illness, military service or for some other reasons of the service or in case of force majeure;

4. in other cases where requested by the employees.

Compensation laid down by the Federal law for cases where the maximum legal turn of duty is exceeded is so arranged that the average turn of duty for the day in question and for the three following working days does not exceed 14 hours on the average.

If certain turns of duty occur in the morning, day time, evening and night time, they should be distributed between various employees by means of a suitable roster, this not being applicable to employees engaged exclusively for night duties.

The time taken travelling is reckoned at full time as already stated.

Periods of rest.

A daily period of rest should not be less than 11 hours as an average over a period of not more than 14 days, either consecutive or separated by single days of rest, or 10 1/2 hours if the employee lives in a company's house close to his place of employment. The period of rest should not, as far as can be avoided, be less than 12 hours on the average.

The minimum period of rest, including time off as compensation, is 10 hours.

Under special circumstances, which are laid down in the rules, the period of rest may be reduced to 9 hours, provided that the average period over three consecutive days is at least equal to the regular average period as quoted above.

A period of rest should be taken at the home station if conditions permit.

Provided the time off as compensation laid down by law is allowed, the length of the period of rest may be reduced to a minimum of 9 hours in the following cases:

1. in the case where an employee changes over from night duty to day duty, or *vice-versa*, and where a short turn of duty may be whrked in the morning;
2. in the case of periods of rest taken away from the home station;
3. in the case of absence of certain employees owing to illness, military service or for other unavoidable reasons:
4. in other cases, when agreed to by the staff.

When the length of the minimum legal period of rest is reduced by more than a quarter of an hour owing to the late running of trains or boats, or by other unavoidable circumstances, compensation should be made in the 3 following periods of rest so that the period of rest for the day in question and for the 3 following days should average at least 10 hours.

Night duty.

By night duty is meant, the turn of duty between 11.0 p. m. and 5.0 a. m.

No employee should be employed on night duty for more than 7 consecutive nights nor for more than 14 nights in four weeks. This regulation does not apply to turns of duty in which not more than one hour falls within the period reckoned as night duty, and does not apply to employees employed exclusively on night duty.

Days of rest.

Every employee of the Federal Railways is entitled to 56 days of rest per civil year, suitably distributed of which at least 20 are to be on a Sunday or general holiday.

The days of rest should be fixed in advance in accordance with the requirements of the service. The requests from employees to alter days of rest already fixed should be acceded to if service conditions allow and if this does not result in too long intervals between the various days of rest.

Intervals of more than 2 weeks between 2 days of rest and of 5 weeks between 2 Sundays off should be avoided as far as possible.

A day of rest is 24 hours, and the employee should be able to take it at home.

The day of rest should be preceded, either immediately or as close as possible, by a period of rest of at least 9 hours. The average length of this period of rest over a period of not more than 6 weeks should be at least 10 hours for employees employed exclusively on duty between 5.0 a. m. and 11.0 p. m. and 12 hours at least for other employees. Only one period of rest is allowed where the employee takes two or more consecutive days of rest

Periods of rest of at least 28 hours may be counted as half days of rest for employees who change over from evening or night duty to morning or day duty.

If on a Sunday or general holiday the turn of duty does not extend later than mid-day, the remainder of the day can be taken as a half day of rest, provided that the turn of duty is not longer than 5 hours and that the period of rest following immediately on the turn of duty, shall be at least 18 hours before the commencement of the next turn of duty.

From the 56 days of rest granted by the Federal law, one day of rest is deducted for every seven days absence.

It is permissible to work a short turn of duty of 2 hours as a maximum between a period of rest and a day of rest. This practice should not be resorted to except when urgently required by traffic conditions.

The half Sundays off authorised by the Federal law should not be counted in the stipulated minimum number of Sundays off. On the other hand, Sundays and whole holidays which occur during absence from service may be included in the number of Sundays off under the above conditions.

If night duty encroaches more than 2 hours on the Sunday, the following day of rest is not counted as a Sunday off.

Employees who spend the greater part of their time in the operating departments but who are not permanently employed therein are entitled to one day of rest per 6 days of work Some of their days of rest should coincide with Sundays or holidays in a proportion in keeping with the spirit of the Federal law. These employees should also have one additional day of rest at the following rates :

Per 75 working days during the *first three years* of service;

Per 50 working days, from the *fourth year up to the tenth year* of service ;

Per 35 working days from the *eleventh year* of service.

For those who are permanent employees in the operating departments of the Federal Railways, but do not spend their whole time therein, the *number of days of rest* per annum is as follows :

1. 14 days for an *average period of work of at least 3 hours* per day or for *an average turn of duty less than 6 hours* per day;

2. 28 days for *an average period of work* of at least 3 hours but *less than 5 hours per day* or for *an average turn of duty* of at least 6 hours but *less than 9 hours* per day;

3. 42 days for *an average period of work of at least 5 hours* per day or for *an average turn of duty of at least 9 hours* per day.

One third at least of these days of rest should fall on Sundays or holidays.

The number of days of rest for employees who join or leave the service during the current civil year is calculated as follows :

$$\frac{\text{Length of service in days} \times 56}{365},$$

fractions of a day not being counted.

As regards the regulation days of rest for the staff employed in the operating services, one day of rest should be allowed for 6 days work in each month, the remaining days of work being carried forward to the following month as shown in the following table.

The additional days of rest mentioned above at the rate of 1 per 50 or 1 per 35 working days are granted from the beginning of the civil year during which the number of days of rest are to be increased.

When by reason of the late running of trains or other important service circumstances, the period of rest preceding the day of rest of 24 hours does not equal the stipulated minimun of 9 hours occasionally, the day is however considered as a complete day of rest, but compensation should be given for the extension of work in the preceding day and the resulting reduction in the period of rest in accordance with the provisions of the Federal law.

Working days per month.	*Days of rest allowed.*	*Days of rests carried forward to following month.*
January : 19 days	$\frac{19}{6} = 3$	1
February : 21 3/4 days.	$\frac{21\ 3/4 + 1}{6} = 3$	4 3/4
March : 25 days	$\frac{25 + 4\ 3/4}{6} = 4$	5 3/4
April : 25 1/2 days	$\frac{25\ 1/2 + 5\ 3/4}{6} = 5$	1 1/4
Etc.		

Holidays.

Every employee of the Federal Railways in the operating departments is entitled to the following holidays per civil year :

- 7 days during the first 7 years service;
- 14 days on completing 8 years service or on passing the age of 28 years;
- 21 days on completing 15 years service or on passing the age of 35 years;
- 28 days when he completes his 50th year of age.

Each holiday period of 7 days includes one of the days of rest stipulated by the Federal law.

For officials, employees or workmen who spend the greater part of their time in the operating departments of the Federal Railways, but who are not permanently employed therein or the opposite, a year of service is counted as each period of 350 days paid for. In the case of occasional occupation, the days worked are to be added up. For the time during which days of rest are not paid for, one day should be added to every 6 days work. Days of not more than 4 hours work count as half a day and those of more than 4 hours as a whole day.

Special rules for days and holidays.

The regulations stipulate in detail :

1. the extent to which absence on account of illness, accidents, military service or for other reasons may be counted as part of the days of rest and the holidays;
2. the distribution of holidays.

The length of the holidays is not to be reduced on account of absence due to illness, accident or compulsory military service, unless such absence exceeds 70 days per civil year.

In the case of leave without pay for voluntary military service or as a punishment, the holiday is reduced even if the absences have been less than 70 days per civil year.

In the case given above, the length of holidays is reduced by 1/52nd for each week of absence from duty, this reduction being rounded off to the nearest whole day.

The Federal Railway Administration decides not later than December the holidays for the following civil year.

The general headquarters and the district headquarters arrange that each employee take his holidays in turn during the various seasons of the year. Employees cannot however demand to take their holidays during periods when traffic is especially heavy.

In order to ensure a regular turn about in the holidays provided by law, the periods for the various employees are fixed alternatively in different months of the year, observing as far as possible the following order : January, June, November, April, September, February, July, December, May, October, March, August, January, and so on. In this way employees who in one year have taken their holiday in January, in the following year have their holiday in June, the third year in November, then in April, etc. At times of heavy traffic and if all the months of the year are not required when allocating holidays to the various employees, the administration may modify the foregoing arrangement, provided that the principle is adhered to.

In order to make efficient use of the staff, the holidays are spread out as far as possible through the whole year, whilst taking into account the heavy increase of passenger or of goods traffic which occurs at certain seasons, holidays, etc.

Generally speaking, holidays should be taken in one complete period. If service conditions allow, they may, as a special case, be divided up or taken by separate days; this however is only applicable to officials, employees or workmen entitled to at least two weeks holiday.

In the case of absence from duty, one day of rest for every 7 days absence is deducted from the statutory 56 days of rest. If there is on the average more than one day of rest per period of 7 days absence, the additional days of rest should be granted. Compensation is made during the last quarter of the civil year, if not earlier, and should not be carried forward to the following year. In this compensation all absences from duty for the year in question are taken into account.

In case of more than 70 days absence from duty for one of the causes given above, the 70 days shall also be taken into consideration for calculating the reduction of holiday at a rate of 1/52nd per week of absence. The number of days to be deducted is calculated from the following formula :

$$\frac{\text{Normal number of days of holiday} \times \text{number of complete weeks of absence}}{52}$$

The reduction of holidays for the causes given above is independent of the reduction of the number of days of rest made in conformity with the Federal law.

The rules for the reduction of holidays also apply to the grant of additional days holiday. If it happens that days of absence on account of illness, accident or compulsory military service coincide with holidays fixed in advance, the holidays thus lost by the employee should be granted later, provided that the absence from service does not exceed 70 days per civil year. If the 70 days is exceeded, or in the case of leave without pay, or for voluntary military service, or as a punishment, the regulation reduction of holidays is taken into account in the additional holidays to be granted.

Rosters.

The orders putting the law into force regulate the *details*, *the forms* and the size and contents of the rosters of working hours, duties, days of rest and holidays, drawn up by the administration.

The staff should be consulted before the rosters are finally completed.

At each fresh change of duties, tables of working hours are prepared in accordance with the wishes of the staff and in accordance with the requirements and regulations of the service, and these tables show the *nature of the duties* and the *places of employment* at which an employee will have his period of rest away from home.

These tables are prepared in accordance with specimen *sheet A* for *train crews, enginemen and firemen* and in accordance with *sheet B* for *other employees*.

The different departments should be shown separately and designated by a special number on the tables provided with this object.

The duty lists then give, in minutes, the mean daily period of duty, the turns of duty and *periods of rest*. They also show whether *overtime is paid for*, in conformity with the Federal law, for *additional work*.

If an employee has alternatively to carry out *different duties*, a *rearrangement of working hours* is made in accordance with *specimen sheet* C^1 for one *civil* year, or a period timetable on the lines of specimen sheet C^2 *for one month*.

The table of *days of rest* and *holidays* is prepared for a whole civil year in accordance with *specimen sheet D*, and is made known to the staff by appropriate means at least 3 days before coming into force.

Special attention should be given to the preparation of the « duty » lists A and B and « allocation of duties » C^1 and C^2. The responsible officials should not only satisfy themselves that the regulations are observed, but should also make sure that these tables are suitable to the actual needs of the service. They must therefore duly observe the regulations of the Federal law in favour of the staff and also obtain full benefit from those clauses which are to the advantage of the administration.

In cases where the Federal law or the orders putting it into force lay down that the staff must be previously consulted, this is done in the following manner :

The draft duties list and division of duties should be made known to the staff in sufficient time for them to make known their views if they so wish before the tables are put into operation. These wishes are met where the needs of the service and the clauses of the Federal law and regulations allow and where no additional expense is incurred.

Where it is not possible to prepare the tables in sufficiently good time for the train crews, drivers and firemen or for the permanent way staff so that these proposed tables may be made known to the staff before they are put into force, the tables are to be put into force provisionally. If the staff raise no objection within a period of from 2 to 3 weeks, these lists are then considered to be final. Demands for the modification of the tables of duties (sheet A) for train and footplate staff should be addressed in writing within 2 to 3 weeks to the chief of the department concerned. This official examines them as soon as possible and then calls a conference of one delegate from each station or running shed of the staff concerned with the alterations in question. Stations and sheds employing more than 150 men may be represented by two delegates. If, during the conference, it appears necessary to make changes in the working arrangements at stations or sheds not represented, the staff at each of these are entitled to put forward their wishes before the final adoption of the programme of list of duties.

Every care is taken to employ the relief staff in as economical manner as possible. For this reason, each service ought to be considered as only an element of the whole administration. The economic organisation of the operating departments and of the traffic department in particular, makes it necessary that the employees of the various departments shall mutually assist each other.

Reduction in goods service on Sundays and holidays.

Goods trains are not allowed to run on Sundays and general holidays (New Year, Good Friday, Ascension Day and Christmas Day).

The Federal Council may, however, authorise, as an exception, the running of certain goods trains and also take delivery, transport and deliver cattle and perishable goods.

Service buildings and shelters. Barracks.

Except in special cases, the administration shall provide for the use of the staff not able to return home during breaks and periods of rest, or who have to take their meals at their place of employment, with heated messrooms provided with means for hotting up meals.

The service buildings, the shelters for breaks and periods of rest, and also the barracks shall be in a good sanitary condition. The barracks and shelters shall also afford a reasonable amount of comfort.

As regards sanitary requirements at workshops, engine sheds, electric power stations and sub-stations, accumulator charging depots, dockyards, etc., in so far as they are not regulated by the Factory Act and provided at least 3 employees are employed on the average, the requirements as to sanitary conditions in factories must be complied with by analogy as a minimum.

If there is a need for a hut at a station and certain difficulties prevent it being provided, it must be provided in the near vicinity. If it is impossible to provide a shelter of this kind for the permanent way staff, tents and cooking ustensils must be placed at their disposal.

At permanent way inspections posts at which there is a company dwelling house, *independently heated shelters* should be provided for the relief staff who do not belong to the watchman's family.

Sleeping rooms ought not, as a rule, to be used by more than 3 employees, and each man is to have his own bed.

Sleeping rooms should not, in general, be used as shelters during breaks in duty.

As far as possible crossing keepers houses should be provided with drinking water.

Guarantee of wages and salaries.

The Railway Administration is obliged to pay for the days of rest and holidays prescribed by the Federal law

No reduction ought to be made, in view of the privileges granted the Staff by the said law, on the wages or salaries for a complete civil year. Nor can the staff claim, in view of these privileges, an increase in pay.

The guarantee of wages and salaries stipulated by the Federal law does not affect payments such as bonuses for fuel economy, payment by mileage, etc., which depend upon the carrying out of certain conditions.

The pay for the days of rest ought to be the same as that for the days of work.

Departures from the provisions of the act.

Where special conditions render it necessary, the Federal Council may, after a consultation with the staff concerned, authorise departures from the provisions of the law.

The Federal Railway Department is authorised, under the above conditions, to lay down these departures from the regulations.

Demands which refer to turns of duty, distribution of duties, days of rest or holidays, ought to be accompanied by a copy of the forms A, B, C or D mentioned above.

Departures agreed to by the Federal Railway Department ought to be brought to the knowledge of the staff concerned by the Management without delay.

State control and supervision.

The Federal Council sees that the requirements of the law on the working day are carried out.

It issues orders detailing how this supervision is to be exercised and also on the methods of procedure to be followed in dealing with complaints from the railway staff with regard to non-observations of the law or of the orders putting it into force.

The staff are required to notify, as soon as possible, either verbally or in writing, to the chief of the department or to his immediate assistant, any departure from the Federal law or orders where these are not exceptions authorised by the controlling authority. The manner in which such complaints are dealt with should be conveyed to the staff concerned without delay.

After having availed themselves of all the proper channels for forwarding complaints to the Federal Railway Administration, employees may appeal to the Federal Railway Department to protest against steps or decisions taken by the Railway Administration in applying the Federal law or orders. The Federal Department requires the Administration to report on the claims in question.

On the demand of the Federal Railway Department, the Federal Railway Administration should forward copies of the working hours and duties list, days of rest and holidays, and give a statement of the views of the staff who have been consulted in conformity with the Federal law on the questions concerned.

The Federal Railway Department will take the necessary steps to ensure that the regulations are properly applied.

Provided their position is sufficient to justify it, the officials of the Federal Railway Department are empowered at all times to ascertain at the place concerned if the provisions of the Federal law and orders are being properly carried out by the Federal Railway Administration.

The departments of the Federal Railways are obliged to give careful attention to any communications they may receive as a result of the above mentioned requirements. The staff should not suffer any prejudice, either direct or indirect, as the result of having made such complaints.

The consultative committee.

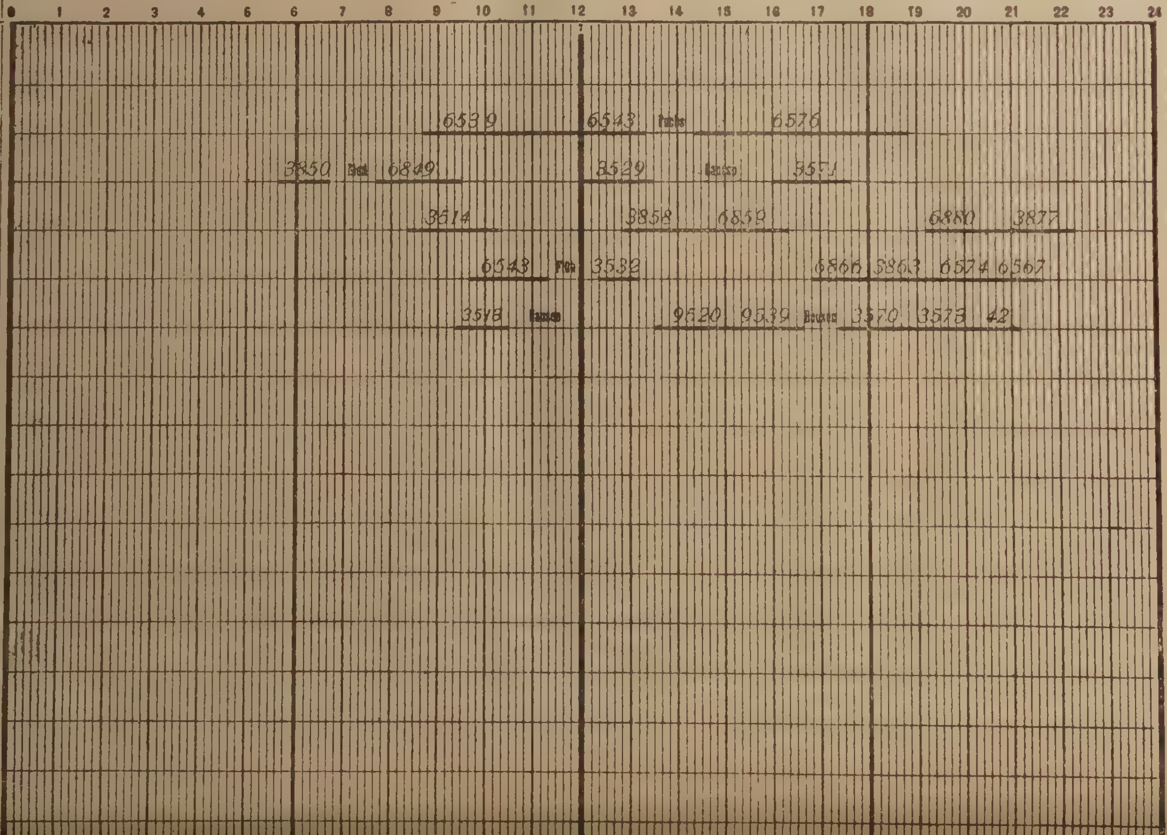
The Federal Council appoints for each administrative period, after having received nominations from the administration and from the staff of the Federal Railways, a consultative committee composed of a president and from ten to fourteen members. The Railway Administration and the staff have equal representation on this committee.

FEDERAL RAILWAYS.

FORM A.

Duty list

of the staff .... *from* .... *19* . . *to* *19*

Depot and grade of staff. 1	*Service.* No 2	Commencement of duty at 3	Minutes. *Duration of work.* (Article 3 of law.) 4	Minutes. *Period of duty.* (Article 5 of law.) 5	Minutes. *Period of rest.* (Article 6 of law.) 6	Diagram of the length of the day's work.	End of duty at 8	Remarks — *Company's house close to place of employment. Hours overtime to be paid.* 9
Flurschach								
Guards.	1	*Flurschach*	550	610	650		*Flurschach*	
	2	*Flurschach*	370	720	880		*Niedersee*	
	3	*Niedersee*	520	840	680		*Flurschach*	
	4	*Flurschach*	440	720	700		*Flurschach*	
	5	*Flurschach*	490	710	690		*Flurschach*	
Average.			474	720	720			

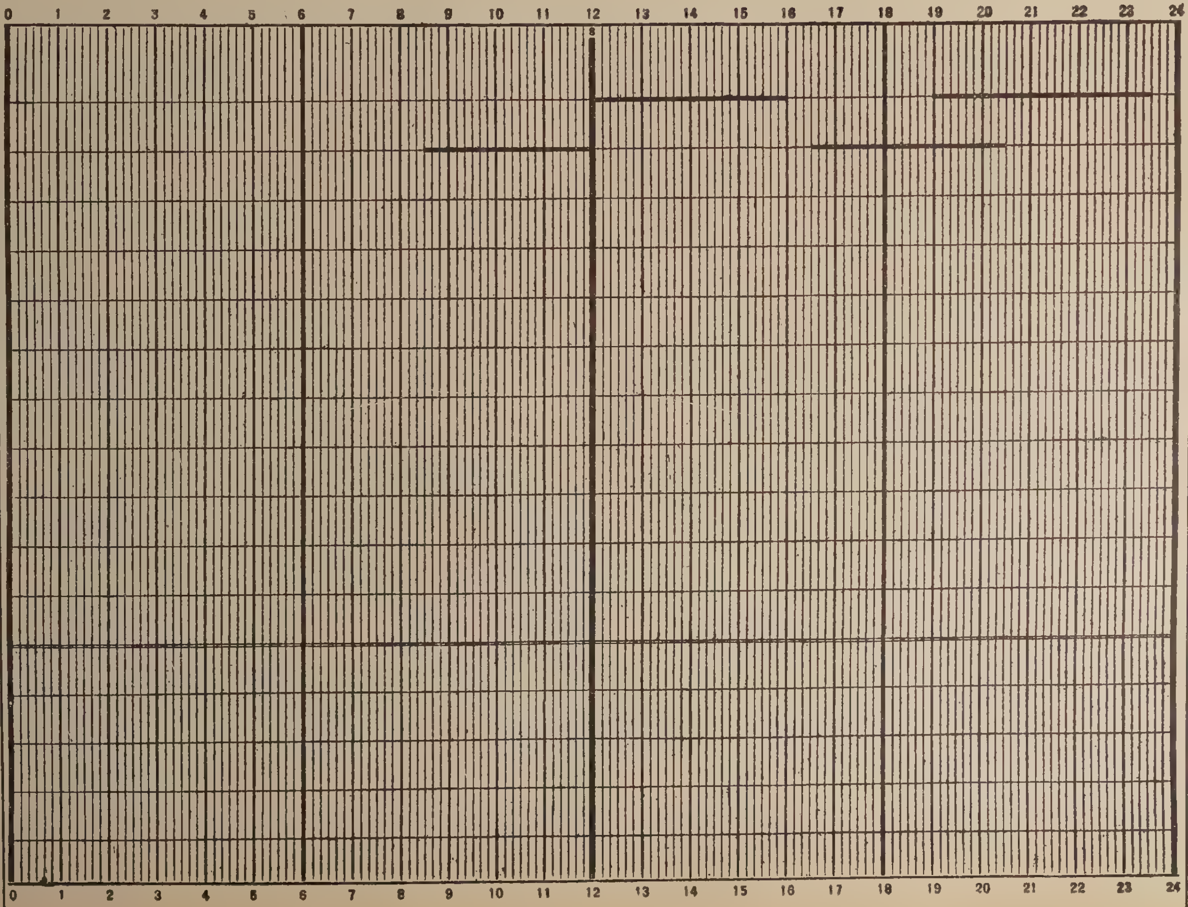
EXPLANATION OF SIGNS : $\frac{135}{\text{Train or voyage}}$ *Train working ;* ~~~~ *Work at shed or shops ;* - - - - *Reserve ;*

of the staff .... *from* .... *19*........ *to* .... *19*........

Station, line or depot. 1	Employment (description of duty). 2	Service. No. 3	*Number of employees on a turn of duty.* 4	Minutes. *Duration of work.* (Article 3 of law.) 5	Minutes. *Period of duty.* (Article 5 of law.) 6	Minutes. *Period of rest.* (Article 6 of law.) 7	Remarks: *Company's house close to place of employment. Hours overtime to be paid.* 9
Orval	*Assistant.*	*1*	*1*	*510*	*690*	*750*	
		2	*1*	*450*	*720*	*720*	
	Average.			*480*	*705*	*735*	

Diagram of the length of the day's work.

EXPLANATION OF SIGNS : ....



218
19

FEDERAL RAILWAYS.

Allocation of duty of the staff

Date :	*January*																			
	February																			
	March																			
	April												1.	2.	3.	4.	5	6.	7.	8.
	May	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	etc.					
	June																			
	July																			
	August																			
	September																			
	October																			
	November																			
	December																			

No.	**Name.**	**Employment.**	*Year of birth.*	*Year entering service.*	EXPLANATION OF SIGNS : ‖ *Sunday;* 6, 7, 8, *No. of the service;* **R** *Spare*																		
1708	*Meyer Anton*	*Pointsman*	*1889*	*1908*	*R*	*6*	*7*	*8*	*9*	—	*11*	*12*	*13*	*14*	*15*	*16*	*17*	—	*19*	*20*	*21*	*7. IV* —	*2*

FORM C¹.

on, line or depot .... *from the* .... *to the* ....

																					Remarks.
	12.	*13.*	*14.*	*15.*	*16.*	*17.*	*18.*	*19.*	*20.*	*21.*	*22.*	*23.*	*24.*	*25.*	*26.*	*27.*	*28*	*29*	*30.*		
																				1.	

of rest; = *Half day of rest;* —— *Holidays;* ....

																									Days of rest and holidays.				
																					New Year.	*Good Friday.*	*Ascension Day.*	*Christmas Day.*	*During the week.*	*On Sundays*	*Half days*	*Date of holidays*	**Total.**
									21. IV																				
	6	*7*	*8*	*9*	*10*	—	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	—	*2*	*3*	*4*					*14*	*4*		*7.–21. IV*	*18*

220
21

FEDERAL RAILWAYS.

Allocation of

19	*Month*		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
No.	**Name.**	**Grade.**	Explanation of signs : || *Sunday or general holiday;*										
1	*Mercier Jules*	*Driver*	*17*	*18*	*19*	—	*21*	*5*	*6*	*7*	*R*	*9*	*10*

Remarks : ……………………………………………………………

FORM C².

he staff .... at ....

umber of the service; **R** Spare duty; — Day of rest; = Half day rest; ▬ Holidays :

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.
13	*14*	*15*	*R*	*17*	*17*	—	*R*	*20*	*21*	*5*	*6*	*7*	*8*	—	*10*	*11*	*12*
	=																

FEDERAL RAILWAYS.

Total of days of res

Number.	Station, line or depot.	Employment.	Name.	Year of birth.	Year entering service.	Date of days o																							
						January.					February.					March.					April.					May.			
1	Soprano	Labourer.	Albertini B.	(1) 1890	1908	3	12	17	25	26																			
						31																							

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(1) To be filled in only for employees entitled to holidays. On the other hand, for staff employed for the greater part of their time, but not permanently employed, show the period of employment during the civil year, for example : « from the 1st May to the 31st October »,

Form D.

staff .... for the year.....

t and holidays in the month of							Annual number of days of rest and holidays.			
June.	July.	August.	September.	October.	November.	December.	During the week.	On Sundays.	Half days.	Total.
	7 | 8 | 9 | 10 | 11									
	12 | 13 | 14 | 15 | 16									
	17 | 18 | 19 | 20						48	20		68

Note. — The employee is notified the date of the complete day of rest each month.

....

....

The consultative committee is in particular required to give a preliminary opinion on proposed orders for applying the law and also on questions which may result in the Federal Council giving judgments of general application or decisions on appeals and complaints, or to penal measures.

Penalties.

The Federal Council may punish non-observances of the law dealing with hours of duty by a fine not exceeding 500 francs, and not exceeding 1 000 francs if repeated.

The punishment is incurred by the administration alone if the staff declare their withdrawal from the application of the Federal law.

For infringements by the Railway Administration of the legal arrangements or of the steps taken by the Federal Railway Department to apply them, the above mentioned penalties will be the rule.

When the Federal Department is aware of non-observances of the regulations or of contravention of its decisions, it establishes the facts as far as necessary, and after demanding an explanation from the Federal Railway Administration, submits, if necessary, to the Federal Council, proposals as to the penalty to be inflicted.

When it is a question of infringements committed by officials of the Federal Railways, the competent authorities of this administration take disciplinary action, either on their own initiative or at the request of the Federal Railway Department.

Operation of the law.
Annulment of pre-existing regulations.

The Federal Council is responsible for bringing into force the law on the hours of duty and fixes the date for it to be put into operation.

If the Federal Railway Administration is obliged, on account of the application of this law, to increase its staff, the Federal Council may, on reasonable demand, grant a reasonable time to allow the law to be completely complied with.

The requirements of the present law supersede pre-existing laws, especially that of 19 December 1902 dealing with the hours of duty in the operating departments of transport undertakings.

In this article we have given *details* of *a code* of *laws* on the application of the eight-hour day to the staff *in the operating departments* of a large railway system.

We have limited ourselves this time to *the analysis of the technical conditions* under which the clauses of the regulations have been applied.

In dealing with the question in this way, we have tried to *bring out the methods* arising out of *the legal arrangements and the technical possibilities*, especially as regards the *rational organisation of the work*, having *the best use of man-power* in the railway service as its object.

[385 .113 (.43)]

The German Railways
during the second financial year of the German Railway Company (1926)
as revealed in report No. 5
of the Inspector of the German Railways to the Reparations Committee (1).

(*Revue Générale des chemins de fer*, September 1927.)

The fifth report of Mr. G. Leverve, the Inspector of the German Railways, to the Reparations Commission, was published on the 1 June 1927, and was presented with the object of revealing the operating results of the second financial year of the German Railway Company (1 January 1926-31 December 1926), as also the first results of 1927.

I. — Reparations dues.

The payments to be made as reparations dues during the first years are arranged as follows :

First year : (1 September 1924, 31 August 1925)	200	million gold marks.
Second year : (1 September 1925, 31 August 1926)	595	— —
Third year : (1 September 1926, 31 August 1927)	550	— —
Fourth and subsequent years.	660	— —

The plan of the experts provided for half-yearly payments, but by an agreement made between the Railway Company and the Agent-General for Reparations, and approved by the Reparations Commission, monthly payments were substituted for the half-yearly payments, a discount of 6 % being given on the payments the Company had made in advance.

This agreement expired at the end of the third Reparations year, *i. e.*, on the 31 August 1927. A new agreement for the fourth year has just been concluded.

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(1) For the final results of the first year, see the *Revue Générale*, September number 1926. See also *Revue Générale*, March 1927 number, pages 219-232 : « The German Railways in 1925-1926 ».

It may be recalled that the first report gave the operating results of the State Railways for the first half-year's working (1 October 1924 to 31 March 1925), that the second report gave those of the first year's application of the Dawes plan corresponding to the first eleven months of working of the State Railways (1 October 1924 to 31 August 1925) (see *Bulletin of the Railway Congress*, December 1926 number, page 1111) ; that report No. 3 covered the first complete financial period of the State Railways, the duration of which had been specially fixed for 15 months (1 October 1924 to 31 December 1925), in order that the subsequent financial years should coincide with the legal year ; finally that report No. 4 gave the financial results of the second year's application of the Dawes plan (1 September 1925 to 31 August 1926).

It has been drawn up on the same lines, but with the rate of discount lowered from 6 % to 5 % and will be renewed from year to year provided neither of the parties has given three months' notice to terminate it.

The payments made up to the end of May 1927 on account of the third year amount at the present time to a total of 354 830 859.70 Rm., which represent, when the rate of exchange of the Reichsmark in gold marks and the discount of 6 % are taken into account, 360 million gold marks.

During the financial year 1926, 1 January to 31 December, the Company had to transfer first of all the payments for the last eight months of the second reparations year, amounting nominally to 395 million gold marks, and then 180 millions for the first four months of the third year. The total, 575 million gold marks (equal to 87 % of the normal annuity) represents in Reichsmarks at the rate of exchange, a total of 574 millions 268 965 Reichsmarks. This is the figure the Company shews in its accounts. In actual fact, the sum it paid is still less and only amounted to 567 205 719.07 Rm., owing to the 6 % discount of which it benefited by payments made in advance. The Company has, however, shewn as expenditure the total of 574 268 965 Rm. without deducting the discount, as this latter is considered as revenue on capital included in the receipts.

The Company has been able to make the reparations payments in full and punctually, even during the crisis that marked the first half of 1926. It has been able to do this the more easily with the increased receipts noted during the second half of 1926 and the beginning of 1927.

It is true that the annual reparations payements replace in the case of the Reichsbahn the capital charges which disappeared, and which would have been much higher than the annual payment, as the capital expenditure of the German Railways has been valued at more than 24 milliard marks.

Furthermore, the reparations charges amount to 12 % of the receipts. Prior to the War the receipts doubled in a period of eighteen years. If the same thing occurs in the future, the proportion of reparations charges would represent towards 1945 only about 6 % of the receipts, and towards the end of the concession the very low value of 3 %. Without taking into too great consideration any such uncertain hypotheses, these figures at least shew that the reparations charges will become lighter in the future, as the German Railways pursue their normal development.

It should be remembered that the reparations payments are guaranteed by the legal reserve, as well as by the other reserves the Company has formed for various purposes.

II. — **Transport tax**.

The transport tax, 10 to 16 % on most passenger receipts and 7 % on goods other than coal receipts, was collected on behalf of the State during the first reparations year. During the second, the Company paid 250 millions to the reparations account and the balance of the tax to the State.

Article 15 of the law dealing with the Railways laid down that, for the third and subsequent reparations years, the Company would pay 290 millions to the reparations account and the balance produced by the tax to the State. In applying this article, an agreement was made between the Agent-General for reparations payments and the Minister of Finance with the object of obtaining more uniformity in the monthly payments made. The Company no longer pays its contributions to the Agent-General but to the Minister of Finance. The Minister, ignoring the actual effective product of the tax, pays to the Agent-General the

25th of each month a fixed amount of 22 500 000 gold marks, or 270 millions a year. At the end of the reparations year, a thirteenth payment is made including the surplus of the amount produced by the tax within, of course, the limit of 290 millions. This arrangement does not prejudice the legal responsibility of the German Government as regards collecting the tax on transport.

The monthly payments made by the Company, corresponding to the amount produced by the tax, amounted, at the end of May 1927, to a total of 182.3 millions.

III. — Preference stocks.

The preference stocks of the German Railway Company, the 7 % dividend on which ranks after the reparations dues, have been issued to the value of 881 million gold marks to date, divided as shewn in table I.

Table 1.

SERIES.	Date of issue.	Face value (in millions of gold marks).	Rate of preference dividend.	Cost to the Company (in millions of marks).	Subscribed by	*Remarks.*
First series . .	Sept. 1925	500	7 %	35.0	State.	Shares, the interest of which should go to the State in accordance with the Statutes and which were transferred direct to the State.
Second series. .	Sept. 1926	124	7 %	8.7	State.	
Third series . .	March 1926	107	7 %	7.5	State.	
Fourth series .	June 1926	150	7 %	10.5	Public.	Preference dividend guaranteed by the State.
		881		61.7		

The State subscribed the whole of the first three series : towards the fourth, which was open to public subscription, the Post Office subscribed a nominal amount of 27.5 millions and the Ministry of Finance 21.5 millions, so that out of a total issue of 881 millions, 780 millions, or 88.5 %, are held by the State or Government Departments.

The report notes that this situation does not agree with the intentions of the Committee of Experts which attached great importance to the preference stocks being sold to the public. It should therefore be considered as a temporary arrangement, and full liberty has been reserved to the Company to repurchase the stocks ceded to the State so as to issue them to the public. This right of repurchase is assured the Company for a period of five years from the date of cession at a price equal to that at which they were sold.

It is to be hoped that the Company will take this step as soon as the money market becomes favourable. Furthermore, the Stock Exchange prices shew the favour in which these stocks are now held. Whereas the price of issue in June 1926 was 95.5, the actual price is about 105, after having reached 117.

On the preference stocks issued publicly, an amount of one million has been reserved for subscription by the staff of the State Railways. In this way the Company has made its staff interested in the prosperity of the undertaking.

IV. — Credits granted the Company by the State and the financing of capital expenditure.

The State undertook to place at the credit of the Company, in order to prevent work being stopped two distinct sums :

A first credit of 53 313 000 mk. for the completion of new lines commenced prior to the repurchase of the railways from the provincial States and which the State had undertaken to complete;

A second credit of 100 million marks for increasing the programme of relaying, improvement in the stock and for a certain number of large works, amongst which the electrification of the lines in Berlin and suburbs figures for 20 millions.

From the first credit during the year 1926, the Company only took 5.7 millions. The second credit has now been entirely expended in agreement with the clause which required the works to be terminated by the 1 April 1927.

Out of the balance of 100 millions, at 31 December, the State had paid 58 millions only; subsequently it paid a further 22 millions, bringing the total to 80. The Company has not so far taken up the 20 millions set aside for the electrification of the Berlin lines, the special conditions governing this payment appearing to it to be too onerous.

The previous report of Mr. Leverve shewed that the Company had adopted in 1926, for financing capital expenditure, a new policy more in conformity with the principles of a normal management. It has made provision in fact for the capital account of 1926 to be covered by two loans, whereas in 1925 it was met entirely by operating receipts.

Of the two issues of preference stock in 1925, the first, the receipts of which went to the State, provided no funds for the Company, and from the second, part of which was used to liquidate an old debt of the Company, only the balance (38 millions) was brought in as received in January 1926. The year 1926 therefore benefited by the first new capital. To this must be added the result of the two preference stock issues made during the year (107 and 150 millions), the credits given by the State on which at 31 December 1926 it had paid 5.7 and 58 millions, and finally various credits to a total of 13.3 millions supplied by the provinces or cities for certain works. The total thus obtained amounted to 372 millions, so that the capital expenditure in 1926, 408 millions, was covered for the most part by these loans.

V. — **Financial operating results.**

The accounts and the balance at the end of the financial year 1926 have been approved by the Administrative Council at its meeting of 31 May 1927.

The receipts of the year 1926 amounted to 4 541 millions as compared with 4 669 for the corresponding period of 1925 (that is, a reduction of 3 %). The operating costs amounted to 3 681 millions, a reduction of 7 % on those of the corresponding period of the previous year, which were 3 975 millions. This reduction was made principally in the expenditure on equipment and coal. As regards equipment, this is due to there having been included in 1925, in the expenditure on maintenance and renewal, certain improvements or extensions which ought as a matter of principle to have been charged to capital expenditure. As regards the cost of coal, it fell by 29 million marks as the result of the reduced consumption, and also the lower cost price which latter fell from an average of 20.25 mk. in 1925 to 18.92 mk. in 1926.

As regards the cost of staff, there has been, on the whole, an increase of about twelve millions over the preceding year, in spite of a reduction of 26 millions on the wages, resulting from the reduction in staff made in 1926. This saving was counter-balanced by an increase of 38 millions on the total payments for pensions, administrative expenses, and for various other expenditures. Amongst the increases noted, may be quoted the rewards and premiums the Company instituted during the last quarter of 1925, with a view to inducing the staff to effect operating economies. The greater part of these increases are, however, outside the control of the Company : excessive pensions due to the excess staff recruited before the Company was formed, superannuation and aid funds. If the pensions alone be considered, it will be found that the pensions to families, widows and orphans and retired pay, amount to 418 millions, whereas in 1913 the corresponding expenditure was only 114 millions.

The operating ratio for the year 1926 was 81.06 % against 85.56 % for the year 1925 and 70 % pre-war (1). This ratio is very near the 80 % the Experts forecast in their report of March 1924.

The excess over working expenses of 860 millions has been allotted as follows:

Reparations	574	millions.
Debt services and new loans	0.2	—
Legal reserve (2 °/o of the receipts)	90.8	— (2)
Dividend on preference stocks issued	40	—
Reserve for amortization of operating dues and losses	70	—
Reserve for carrying out works programme	70	—
Balance brought forward	15	—
	860	millions

After having met its legal obligations, that is to say, after paying 574 millions for reparations obligations, set aside 2 % of its receipts for the statutory reserve, and provided for the dividend on preference stocks issued, and also having amply provided for the amortization account, the State Railway Company had an available surplus of 85 millions, which it allocated in part to new orders and the remainder (15 millions) is carried forward.

If this surplus of 85 millions is added to the 574 millions paid as reparations, it will be found that by the year 1926, which was a bad year, the sums the Company should have paid as reparations already reached 660 millions, the normal annual payment. Subsequent to 1 September 1927, the beginning of the fourth reparations year, the Company will have to meet the full charge, and the financial results obtained in 1926 make it appear that the Company will be able to bear it.

On the other hand, the expenditure may be compared with the receipts in the following manner, which also brings out some interesting features. If it is considered that the operating receipts amounted to 4 541 millions in 365 days, the cost of wages and salaries represent 161 days receipts, material 98 days, renewal costs 37 days, reparations payments 46 days, the preference dividends 3 days, and the various reserves 20 days. Compared with the preceding year, the expenditure on operation and renewals has fallen to an extent equal to 16 days receipts, the operating saving increasing relatively thereto by the same amount.

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(1) These coefficients may be contrasted with those of some foreign railways. In the U. S. A. the first-class railways had a coefficient of 69.92 °/o in 1913, 74 °/o in 1925, and 73 °/o in 1926. In England the coefficient was 63 °/o in 1913, increased to 83 °/o in 1925 and 91 °/o in 1926 (the year of the miner's strike). In Switzerland, the coefficient of the Federal Railways went from 67 °/o in 1913 to 72 °/o in 1925 and 77.79 °/o in 1926. In France it was 63.90 °/o in 1913, 84 °/o in 1925 and 75 °/o in 1926.

(2) The legal reserve is obtained by paying to it 2 °/o of the gross operating receipts in accordance with article 25 of the Statutes. It has risen from 113 millions at the end of the financial year 1925 to 204 millions at the end of 1926, and was 242 millions at the 31 May last. It should continue to grow until it reaches the limit of 500 millions.

It will be noted that the amount of this reserve at the present time amounts to about 5 °/o of the total receipts of the year, and that it will hardly represent more than 10 °/o when it reaches its statutory maximum. This reserve therefore does not appear excessive as it is not unusual to see the receipts of railway companies fluctuate by over 10 °/o from one year to another. The receipts of the State Railway Company in this way fell 11 °/o during the first four months of 1926.

Up to date, the report gives briefly the first results of the year 1927, which are favourable. The preliminary results shew not only an important increase compared with the first month of 1926, which were it is true extremely bad, but they are also better than those of 1925.

This rise in receipts follows on the improvement already visible towards the end of the previous year. It is due to the increase in goods traffic. The passenger traffic, on the other hand, remained at exactly the same level as in 1926.

The estimated total nett receipts (transport tax deducted) for the first four months of 1927, amount to 1 486 million Reichsmarks against 1 260 for the same period of 1926, and 1 443 in 1925 and shew an improvement of 18 % and 3 % respectively.

The receipts of the first months of 1927 are therefore satisfactory whilst at the same time the general economic situation in Germany appears quite clearly to be improving. New and heavy burdens are however, already in sight: the wages of the workmen have just been increased and undoubtedly will be followed by increases in the salaries of the staff : the expenditure on new works grows : and in addition there is a strong demand for a revision of the rates which may result in a serious reduction in receipts : finally, the competition with the railways of other forms of transport, such as the automobile, develops from day to day.

For all these reasons, the report concludes, the Company ought to follow a cautious policy as an excessive increase in its costs, or a falling off of receipts, would quickly make the margin of profit of its working disappear.

VI. — « Verkehrs-Kredit-Bank » (Bank for Transportation Credit).

The report again mentions that most of the available moneys of the State Railways is deposited with the « Verkehrs-Kredit-Bank », which acts in fact as the finance department of the Company. These funds amounted at the 31 December last to 529 millions. They have been deposited so far either with banks (State Bank, Chief Banking Companies, or Public Departments) on deposit, or against different credits, amongst which long dated credits for transport costs.

In view of the large amount of the moneys controlled in this way, many objections have been raised against the present organisation which is based, on the one hand, on the requirements of the financial policy and the benefit to the State Bank of concentrating into its hand all the resources of the State, the Provinces, and the great public services, such as the State Railways, so as to control the financial market; and on the other hand, on the fact that the Company only draws part of the profits produced by its funds without getting, owing to the small capital of the Bank handling them, any appreciable additional guarantee.

Against this, the « Verkehrs-Kredit-Bank » has been of assistance to the Company as throughout the territory of the State, it has handled all payments on behalf of the Railways and has arranged the payment of all dues on transport credits, thanks to a well developed organisation and under conditions that would make it difficult to replace it.

Negotiations have taken place between the State Bank and the Company with a view to investigating the matter. They resulted in the adoption of a provisional arrangement which has been put in force experimentally until the end of the present year. The new organisation consists in leaving with the « Verkehrs-Kredit-Bank » the moneys necessary for its operations and to deposit the remainder with the « Golddiskontbank » which is closely allied to the State Bank. This latter is required to make such use of the moneys so received as to pay the Company a rate of interest only slightly lower than that received previously. This loss of interest is unimportant in comparison with the additional guarantees of security afforded by the intervention of the State Bank. Experience will prove the benefits resulting from the new organisation, or indicate the improvements to be made thereto.

VII. — **Staff position**.

As is well known, considerable reductions in the staff have been made during the last three years.

The report notes that the Administration appears to have reached the limit of the reductions possible, and to have arrived at a normal stable establishment of the staff.

The staff of the State Railways, which in September 1926 amounted to 724 616 employés, 317 516 staff and 407 100 workmen, both permanent and temporary, was slowly and continuously reduced until February 1927 when the lowest figures recorded were reached : 652 617 employés, 315 400 staff and 337 217 workmen. At March, whilst the staff had been further reduced slightly, seasonal work had caused an appreciable increase in the number of workmen, and in consequence, the total staff had risen to 680 688 employés, 315 112 staff and 365 576 workmen.

In this way, the reduction of staff ordered by the special decree of the 27 October 1923 (« Abbau-Verordnung ») affected 328 732 employés (110 796 staff and 217 936 workmen).

In spite of the staff having been stabilised, the cost of staff appears likely to increase in the near future.

The base rates of pay of the staff were last revised in November and December 1924. The housing allowance has since been increased on the 1 April 1925 by 10 %, and on 1 April 1926 by 5 %. In 1927 a further increase in rents due to legislative enactments resulted in a proportionate increase in the housing allowance, which after an increase of 10 % on the 1 April, was raised by 10 % on the 1 October. The additional cost to the budget was 46 million marks. It is expected, in addition, that in the immediate future, probably before the end of 1927, the base rates will also have to be increased. It is noted that in terms of their real value, based on the cost of living index, these rates have not yet reached the level of 1913 for certain classes of employés. As, however, the salaries of the staff of the State Railways, follow generally the changes of those of the State, any alteration cannot be made until the Government has come to some definite decision as regards its own servants. This probable revision of the salaries would mean a heavy charge for the State Railways as an increase of 10 % in salaries, would amount to about 150 millions of marks a year.

The pay of the workmen of the State Railways has been raised several times since the Company was formed. In November 1924, when the salaries of the staff were revised, the rates of wages were raised about 9 %. The 15 March 1925, the Minister of Labour ordered them to be increased 3 pf. an hour, and in September 1925, the State Railways itself decided to grant a further increase of 1 to 3 pf. an hour, according to the class of labour. The last revision was on the 20 December 1925. The increases were then fixed by a ruling of the Minister of Labour at 1 or 2 pf. an hour, according to the rates of pay of the groups to which the men belonged. A legal dispute that arose between the Company and the Minister of Labour delayed the application of this change. The Company considered it essential to obtain a legal decision first of all as to whether the order of the Minister of Labour was compatible with the prescription of the law on Railways, which reserved the fixing of rates of pay to the Administrative Council and the Management of the Company. When the special Arbitration Tribunal of Leipzig, consulted on the matter, replied in the affirmative on the 9 June 1926, the new regulation as to rates of pay was put into force as from the 1 July 1926, a lump sum payment being made to the workmen for the period from the 1 January. The year 1926 was, as regards pay, one of quiet, during which the German national financial position continued its progressive restoration from the period of crisis.

Since the beginning of 1927, the situation has suddenly changed. As usual, the industrial improvement led to fresh demands for increased pay. These demands were general, and the State Railways like most undertakings, was also affected by the agitation which concerned however more especially the mines and steel industry.

An arbitration award of the 8 April 1927, the Minister of Labour confirmed and ordered to be put into operation laid down that : 1. The base rates of workmen of 24 years age shall be raised 4 pf. an hour, and those of female workers 3 pf. for the period 1 April to 1 October; 2. the wages of all workmen over 24 years age shall be raised an additional 1 pf. per hour as from the 1 October 1927; 3. the over-time worked above the 48 hours of the regular week shall be paid, the first three by a special payment of 15 % of the normal rate and the next three by one of 25 % ; 4. the increase of pay per day worked, for workmen who work by shifts, shall be raised from 15 to 27 pf. As the award cannot be denounced by either party before the 31 March 1928, the stability of wages is assured until that time under fixed conditions.

This decision was completed by an agreement as to the hours of duty, which at present only applies to the shopmen and permanent-way men. This agreement had the effect of reducing the regular 9 hours' day and 54 hours' week to 8 hours a day and 48 hours a week. It lowered, in consequence, the limit above which over-time had to be paid.

The State Railways estimate the additional cost due to these decisions on the increase of wages and the reduction of hours of work at 75 million marks a year, and at 50 millions for the period 1 April to the 31 December 1927.

VIII. — Traffic.

A. — Passenger traffic.

The decline in passenger traffic, to which attention has already been called in the previous report, continued during the whole of the year 1926.

The final statistics give the figures shown in table 2.

TABLE 2.

—	1926 (in thousands).	1925 (in thousands).	Change in relation to 1925 (as a percentage).
Passengers carried	1 819 412	2 106 278	— 13.62
Passenger-kilometres . . . . (Passenger-miles)	42 922 387 (26 671 227)	48 950 273 (30 416 849)	— 12.32
Average distance carried, in kilometres (in miles)	23.59 (14.66)	23.24 (14.44)	+ 1.5

If, however, the 1926 figures are compared with those for 1913 (the system limited to its present boundaries) an increase of 15.4 % in the number of passengers carried and of 17.3 % in the number of passenger-kilometres will be noted.

As regards the passenger traffic during the first months of 1927, the position remained at the same level as the previous year : the provisional receipts however shew a slight increase over those of 1926.

The total receipts from passenger and parcels traffic in 1926 amounted to 1 320 millions, a reduction of 7.7 % on the 1925 figures, in spite of the passenger rates having been raised 10 % on the 1 May 1925. In relation to 1913, however, the receipts increased 46 %. This increase is due in part to the growth of traffic, and in part to the increases in rates applied since the war. The increase in receipts remains, however, below the increase in rates owing to the greater proportion of journeys at reduced fares and to the increase in the number of passengers travelling by lower classes : table 3 brings these facts out.

TABLE 3.

—	Receipts.			Passengers carried.			Passenger-kilometres. (Passenger-miles).		
	1913	1925	1926	1913	1925	1926	1913	1925	1926
1st class	2.88	1.48	1.45	0.13	0.04	0.04	0.90 (0.56)	0.39 (0.24)	0.40 (0.25)
2nd —	17.15	13.69	12.45	7.59	5.31	4.91	10.08 (6.26)	7.23 (4.49)	6.54 (4.06)
3rd —	45.10	39.21	38.15	41.99	32.81	32.99	44.30 (27.53)	34.30 (21.31)	33.58 (20.87)
4th —	34.87	45.62	47.95	50.29	61.84	62.06	44.71 (27.78)	58.08 (36.09)	59.48 (36.96)

The average passenger journey shews a slight increase from year to year : it was 22.75 km. (14.14 miles) in 1924, 23.24 km. (14.44 miles) in 1925, and 23.59 km. (14.66 miles) in 1926.

Although a number of trains were taken off, the number of passenger-kilometres in 1926 slightly increased above that of 1925, although it remained appreciably lower than in 1913 as is shewn in table 4.

These figures shew that the German railways at the present time carry, although fewer train-kilometres are run, a greater number of passengers than before the war. A better use of the stock, an increase in the seats occupied on the trains and in the number of passengers carried per vehicle axle are revealed. In this way since the war, in Germany as in the other countries, steps have had to be taken to get more economical operating results, whilst at the same time the public has been induced to travel more often by the provision of new facilities.

The time-tables were improved in 1926 as regards both the internal and the international services (new express train between Berlin and Frankfort-on-Main with connections for Basle, a new express train between Basle and Hamburg with connections with Scandinavia, and finally the Nord Express between Paris, Berlin and Warsaw with connections with Vladivostock).

The working speed of the express trains was again increased in 1926 (see table 5).

The Company has put into operation special trains at reduced rates for summer and winter holiday seasons, and has increased the time during which return tickets for Sunday excursions are available. A new system of telephoning with trains whilst running was made available for passengers in January 1925 on two trains between Berlin and Hamburg. The Company intends to extend this « Zugtelefonie » to eighteen of its main lines.

TABLE 4.

OPERATING RESULTS.	1913	1925	1926	1926 compared with 1913	1926 compared with 1925
Train-kilometres (train-miles) [in millions] . .	420 (261)	327 (203)	346 (215)	— 18 °/o	+ 6 °/o
Axle-kilometres (axle-miles) of passenger-carrying vehicles (in millions).	7 952 (4 941)	7 578 (4 709)	7 491 (4 655)	— 6 °/o	— 1 °/o
Passenger-kilometres (passenger miles) [in millions].	36 599 (22 742)	48 950 (30 417)	42 922 (26 671)	+ 17 °/o	— 12 °/o
Number of passengers per vehicle-axle.	4.6	6.5	5.9	+ 28 °/o	— 9 °/o
Use of seating (as a percentage)	25.7	33.4	30.1	+ 17 °/o	— 10 °/o
Receipts including luggage (in millions). . . .	904	1 431	1 320	+ 46 °/o	— 8 °/o

TABLE 5.

SECTION.	Average speed of express trains, in kilometres (in miles).		Speed of the fastest trains, in kilometres (in miles).	
	1925	1926	1925	1926
Berlin-Frankfort	56.0 (34.8)	61.9 (38.5)	60.5 (37.6)	72.3 (44.9)
Berlin-Cologne via Essen . . .	61.4 (38.2)	62.7 (39.0)	72.1 (44.8)	73.0 (45.4)
Berlin-Hamburg	66.3 (41.2)	69.7 (43.3)	77.9 (48.4)	82.0 (51.0)

The passenger rates have not been altered since the last increase of the standard tariffs on the 1 May 1925. A reduction of 25 % for foreign visitors to the German Fairs has been granted however, and certain arrangements in force for journeys at reduced rates have been revised on more generous terms.

In 1926, the average receipt per passenger-kilometre was 3.75 pf. (6.53 pf. per passenger-mile) for travellers at full rates, an increase of 38.4 % on 1913 : for journeys at special reduced rates the receipt was 1.56 pf. (2.51 pf.), or an increase of only 21.9 %. As a whole, the average receipt has risen from 2.97 pf. per passenger-kilometre (4.78 pf. per passenger-mile) and, including luggage and accessory receipts, to 3.08 pf. (4.96 pf.), an increase of 24.7 % on 1913.

If the tax be included, the price per passenger-kilometre for the whole of the journeys at full rates and journeys at reduced rates in 1926 was about 36 % higher than before the war. This increase does not seem excessive if account is taken of the fact that the cost of living index established by the Statistical Office of the State has risen, on an average, in 1926, to 141.2 (1913 = 100).

The reporter again notes the much used fourth class is found, even on long distance trains, and that the rates for this fourth class are considerably less than the price of third class in most other European countries. The fourth class only exists in Germany and Poland; most other countries have three classes of passengers. In England, in practice, there are only two classes, and in the United States one, with, in addition, the special accommodation given by the Pullman cars.

Competition with the railways. — The report considers that the decline in passenger traffic, independently of fluctuating economic conditions, is due to the competition of other forms of transport, and in particular to the automobile. This is proved, the same causes elsewhere producing the same results, by the fact that the falling off is not peculiar to the German Railways, but is a general phenomenon found also markedly in England, Belgium, France, Spain, Norway, and especially in the United States where the passenger traffic, which increased from 1914 to 1920, has since steadily fallen off as the result of this competition. This drop is especially noticeable in the Southern and Western States, where the traffic on the roads, not yet being congested, lends itself more easily to further increases in motor transport. The decline in passenger traffic in these States amounted to 37 % as compared with 1920.

In Germany, although the number of motor vehicles increased from 153 000 in 1923 to 308 000 in 1926, *i. e.*, it more than doubled in three years, it must not be forgotten that the proportion of motor vehicles to the population is only one per 211 inhabitants, whereas it is 1 in 74 in Sweden, 1 in 54 in France, 1 in 49 in England, and 1 in 6 in the United States.

A considerable development of motor transport is therefore to be expected in Germany, which will take further traffic from the railways.

This competition was considered in great detail in the preceding report. The present report gives some additional information.

a) *Motor vehicle services.* — Motor services for the public conveyance of passengers continue to develop. The Post Office takes first place in these services : at the 1 April 1927, it had 1 504 services in operation over a total length of 26 800 km. (16 650 miles), and carried in the period January-November 1926, 23.1 million passengers. In addition to passengers, the Post carries express parcels which may exceed 100 kgr. (220 lb.) in weight. With such a widespread operation, it is clear that in certain instances the Post will be in competition with the railways. Such a position results in losses of receipts and in supplementary expenditure for both undertakings, and is not at all in the public interest. The Post Office also complains of its financial difficulties and foreshadows a considerable increase of rates in the near future. It is therefore to be hoped that the negotiations between the State Railways and the Post Office to put an end to this competition will shortly result in an agreement reasonably delimiting the sphere reserved to each of the two undertakings.

In addition to the Post Office automobile services, a large number is operated by private companies which carry both goods and passengers.

In order also to do away with this competition between these private companies and the railways, and to co-ordinate transport by rail and road, the old « Reichsbahn » concluded in March 1924 an agreement with the « Kraftverkehr Deutschland G. m. b. H. » which included seventeen of the most important motor transport companies.

The agreement has not given very satisfactory results : first of all, it was not possible to completely suppress the competition of certain transport companies, and secondly in the services operated jointly, the private companies charged the Company too high rates for material carried on its behalf. The Reichsbahn was obliged to nominate a Commission to consider generally the position the Company should take in face of the competition of road motor transport companies.

b) *Aviation.* — The growth of air transport services in Germany is shewn by the figures of table 6 which give the comparative results for 1925 and 1926.

This table brings out, as regards passenger traffic, a reduction in the average journey, which shews the tendency to use air services for relatively short journeys.

For these journeys especially, the price of journeys by aircraft have recently been reduced : at the present time, the journey Berlin-Leipzig costs 24 mk. first class by express train, and 25 mk. by air, and for the Berlin-Breslau journey, 42.40 mk. first class by rail, and 40 mk. by air. Generally speaking, on the air routes through Berlin, the time taken by air is 60 % less than by train and the cost 15 % more than by first class by the same trains.

TABLE 6.

—	1925	1926	In 1926 compared with 1925
Kilometres (miles) flown	4 949 661 (3 075 642)	6 141 479 (3 816 217)	+ 24 %
Passengers carried.	55 185	82 932	+ 50 %
Passenger-kilometres (passenger-miles)	10 603 035 (6 558 550)	14 165 606 (8 802 269)	+ 33.6 %
Average passenger journey (kilometres [miles])	192 (119)	170 (106)	— 11 %
Tonnage carried, in metric (English) tons. goods	521 (513)	1 036 (1 020)	+ 99 %
post.	287 (282)	535 (527)	+ 86 %
Ton-kilometres (ton-miles)	178 328 (109 060)	298 067 (182 288)	+ 67 %

It has been announced that this summer, the total number of kilometres flown daily in the two directions by the regular air services will be 57 000 km. (35 400 miles) which means an increase of 50 % over the length flown in 1926. In particular, a development of the services to the most important seaside and watering places is expected.

There is no doubt that civilian aviation in Germany would not have shewn these results had it not been for the subsidies given by the State, Provinces, communes and various corporations. It is also, the case that the working aviation costs are diminishing considerably from year to year as a result of the technical progress being made.

The report estimates that the competition of aircraft for passenger traffic, and also to some extent for certain classes of goods, will increase in extent. The State Railway Company has, however, not tried to oppose the development of flying : on the contrary, considering the general utility of the traffic, it has made agreements with the « Lufthansa » which operates all the German air lines, in order to co-ordinate rail and air transport. The « Mitteleuropäische Reisebürö » has been authorised to issue special books of tickets for combined journeys by rail and air. In addition, passengers by aircraft can send their luggage by railway without being obliged to buy a passenger ticket from the Company; the rate applied in this case is that for express parcels, and is slightly higher than the luggage rate.

As regards goods traffic, the Company and the « Lufthansa » have recently made a very interesting agreement for the combined transport by rail and air. According to this agreement, goods will be carried over the State Railway Company's lines as express parcels on production of an air service carriage note. The various forms for the journey by rail will be made out by the despatching station on behalf of the « Lufthansa », so that the Company will only be responsible to the « Lufthansa ».

c) *Transportation services in Berlin.* — The report sets out the reasons upon which the Management decided to electrify the Berlin City (Stadtbahn) and suburban system.

It was, in particular, necessary for the Company to retain a traffic being lost day by day to other means of transport : trams, metropolitan, and the buses. Subsequent to 1913, whereas the traffic fell off progressively on the Company's railways, it increased on the trams and buses. Table 7 shews the number of passengers carried by the different systems (in millions of passengers).

TABLE 7.

YEAR.	City and suburban railways.	Trams.	Metropolitan.	Buses.
1913	395.0	652.0	73.0	. . .
1923	643.0	286.0	167.0	23.0
1924	473.8	528.1	182.9	47.0
1925	421.7	768.1	172.2	76.9
1926	370.6	813.1	162.9	112.9

The falling off in the State Railway Company's traffic continued during the first months of 1927; for the January-March period, the reduction, as compared with the preceding year, in the passengers carried recorded was 3.5 %; against this, on the trams the number increased about 8 % and on the buses about 36 %.

The increase in traffic on the trams, Metropolitan, and buses is chiefly due to the Companies having extended their systems since the end of the War, and at the same time improving both their operating methods and their rolling stock.

It is reasonable to think that the electrification of the Berlin City suburban lines, which should be completed in 1928, will remove the inferior conditions on the Company's lines as compared with those of its competitors, and that it will ensure to the State Railway a part of the expected future development of traffic.

The traffic position on the State lines is affected by the rates in force on the competitive services. The report gives some details of the standard rates these undertakings put into force the 15 March 1927.

Prior to that date, the price in pfennigs for a single journey inside Berlin was that given in table 8.

TABLE 8.

—	City Railway		Metropolitan		Trams,	Buses,
	2nd class.	3rd class.	2nd class.	3rd class.	one class.	one class.
Short journey	25	15	20	15	15	15
Long journey	25	15	30	15	15	20

The new tariff has a uniform fare of 20 pf. for the Metropolitan, trams and buses : the difference in price between short and long journeys has been abolished, as has the difference between second and third class in the Metropolitan. This single tariff includes transfer journey by the Metropolitan and the trams and *vice versa*.

The price of a monthly season ticket on the Metropolitan, formerly 16 mk. for second class and 11 mk. for third, has been made 10 mk.: in addition, season tickets for combined journey by Metropolitan and trams have been introduced.

It was hoped that the introduction of the single rate would result in a definite increase in traffic by the Metropolitan and the buses. According to press reports on the first results of the new rates, this is what happened. The City of Berlin had asked the State Railway to take part in the traffic re-arrangement by applying to the City Railway the single fare and single class, but the Company felt it could not meet the City's wishes, as owing to the particular character of its operation, especially as regards the suburban lines, the proposals would have profited neither itself nor the public.

As the single rate on the transport companies in the City of Berlin only came into force the 18 March last, it is still impossible to judge definitely the consequences the changes have had on the State Railway Company's lines. However, from observations made so far, it appears that the difference of price between the 15 pf. of the City Railway and the uniform fare of 20 pf. of the systems has not brought back to the Company, to any appreciable extent, the traffic lost during recent years. During the month of April, the State Railway's traffic shewed a decline of 8 % as compared with that the previous year : the number of second class passengers, which it was thought would increase as a result of the abolition of the second class on the Metropolitan, fell off still more. It is therefore possible that the Company, in order to recover the traffic lost to other means of transport, may be obliged to make certain alterations in the rates in force on its city and suburban lines.

B. — **Goods traffic.**

The report published the comparative figures of the goods traffic in 1925 and 1926 (see table 9).

The traffic in 1926, the conditions of which were unfavourable during the first months (reduction of 3 % as compared with 1925 for the January-August period) for the whole year, shewed a growth on that of the previous year. This increase was principally due to the miners' strike in England and the direct and indirect effect it had on German commerce during the last six months of the year. Not only did the coal mined exceed the pre-war quantity and the value of the excess of export coal over imported amount to 805 million marks, against 238 in the preceding year, but the steel industry was fully employed owing to the cessation of English exports.

TABLE 9.

—	**Year 1926** (in thousands).	**Year 1925** (in thousands).	**Year 1926** compared with **1925**
Metric (English) tons carried .	381 868 (375 837)	373 009 (367 118)	+ 2.38 %
Ton-kilometres (ton-miles) . .	59 016 334 (36 092 518)	55 965 403 (34 226 665)	+ 5.45 %
Average distance hauled (in kilometres [in miles])	154.55 (96.03)	150.04 (93.23)	+ 3.0 %

The increase in ton-kilometres is 14.7 % compared with 1913, for the system limited to its present boundaries.

The number of wagons loaded, per day worked, has reached during the third week of November, the highest figure since the Company was formed: 169 676 wagons, with an increase of 69 338 units on the corresponding number of the first week of the year. Whilst the improvement of traffic in 1926 was clearly visible, the total goods receipts, amounting to 2 831 million marks, were less by 1.3 % than those of 1925. The apparent contradiction is explained by the considerable increase in the coal carried, the tariffs for which are relatively low. Compared with the receipts for 1913 for the system limited to its present boundaries, the 1926 receipts shew a growth of 46.8 %.

The provisional receipts for the first four months of 1927 shew an average increase of 27.9 % on those for the same months of 1926: they are also higher than those of 1925.

In view of the exceptional importance of the coal traffic in 1926, the report considers separately the traffic statistics for coal and for other merchandise.

The comparison of coal carried in 1925 and 1926 is given in table 10.

In 1926, there was, as compared with 1925, a surplus of tonnage carried of 17 million tons. This increase appears to have been entirely due to the English miners' strike. The gain made by the Company through the increased quantity of coal carried is estimated at 92 millions.

Table 11 compares the general goods other than coal carried in 1925 and in 1926.

If the carriage of coal is excluded, the falling off of traffic in ton-kilometres was, in 1926, as compared with 1925, about 9 %, and for the January-May period the reduction was about 20 %.

The favourable growth of traffic after the summer of 1926 resulted in an increase in the number of ton-kilometres as compared with 1925. Table 12 gives, as regards this, some statistics for goods trains, excluding service trains, for 1913, 1925 and 1926.

It will be noted that the number of goods train-kilometres fell in 1926, compared with pre-war, by 9.3 %, whilst the number of ton-kilometres increased 5.45 %. This result shews the progress made by the Company in its operating methods, whereby it has been able to increase its capacity and reduce its operating cost. Amongst the principal measures taken for this purpose must be mentioned : increase in the power of the locomotives, introduction of continuous brakes on goods trains, and especially the increased capacity of the wagons. Whereas before the war, the normal type of wagon was that of 10 tons, the present type is 15 tons, and steps are being taken to build, for the transport of heavy material, 60-ton wagons, the use of which will more than double the working capacity of the lines.

TABLE 10.

—	Metric (English) tons carried (in thousands).	Ton-kilometres (ton-miles) (in thousands).	Average journey per metric [English] ton (in kilometres) [in miles].	Average receipt per ton-kilometre [per English ton-mile] (in pfennigs).	Total receipts (in 1 000 marks).
1926	161 400 (158 850)	25 975 827 (15 885 992)	160.94 (100.00)	3.12 (5.10)	810 359
1925	144 392 (142 111)	19 567 879 (11 967 104)	135 52 (84.21)	3.67 (6.00)	718 525
1926 compared with 1925 . .	+ 11.8 %	+ 32.7 %	+ 18.8 %	— 15.0 %	+ 12.8 %

TABLE 11.

—	Metric (English) tons carried (in thousands).	Ton-kilometres (ton-miles) (in thousands).	Average journey per metric ton in kilometres (per English ton in miles).	Receipts per ton-kilometre (per ton-mile) (in pfennigs).	Total receipts (in 1 000 marks).
1926	220 468 (216 986)	38 040 507 (20 206 526)	149.86 (93.12)	5.74 (9.39)	1 896 000
1925	228 617 (225 006)	36 397 524 (22 259 591)	159.20 (98.92)	5.58 (9.12)	2 032 563
1926 compared with 1925. . .	— 3.6 %	— 9.2 %	— 5.8 %	+ 2.9 %	— 6.7 %

TABLE 12.

—	1913	1925	1926	1926 compared with 1913	1926 compared with 1925
Goods train-kilometres (train-miles) in thousands.	241 600 (150 126)	206 680 (128 427)	218 993 (136 078)	— 9.3 %	+ 5.9 %
Axle-kilometres (axle-miles) of empty and loaded wagons in thousands	17 812 000 (11 068 064)	15 570 977 (9 655 531)	16 998 082 (10 562 309)	— 4.6 %	+ 9.2 %
Average number of axles per train	73	96	79	+ 8.2 %	+ 4.0 %

IX. — Rates policy.

With regard to the rates, the Company has continued its former rates policy : the normal rates have not so far been altered, but reductions have been made by means of special rates so as to develop the traffic as well as to assist the national economical position.

A. — Special rates.

Most of these are for coal. The object of certain of them was to allow Upper Silesia coal to be carried under the same conditions as that from Westphalia and the Rhine, others to help the export of the former to Central Europe, the latter to France, Luxembourg or Italy via Basle, and both towards the German coast.

For all the lines inside the German land frontiers there are special through transit rates to the number of 60. The level of these rates is, in general adjusted to that of the foreign competing lines.

As regards international rates, on the 1 April 1927 a new through tariff between Germany and Czecho-Slovakia came into force, and on 1 May 1927 a new through tariff between Germany and Belgium. In addition, direct transit rates have been fixed for traffic through Germany between the Scandinavian countries and Jugo-Slavia, between Poland and Bulgaria, and between Poland, on the one hand, and Czecho-Slovakia, Austria, Hungary, Switzerland, Italy, Rumania and Jugo-Slavia, on the other.

The whole of these tariff measures has, however, not had any great effect on the average receipts of the State Railways. The receipts of goods traffic was 4.92 pf. per ton-kilometre (8.04 pf. per English ton-mile) in 1925 and fell to 4.59 pf. (7.51 pf.) in 1926, but this reduction was above all due to the exceptional increase in the coal carried. If the transport tax be taken into account, the average charge per ton-kilometre paid in 1926 is 35 % higher than in 1913 : this increase was 44 % in 1925. It must always be remembered that coal alone benefited by a reduction of the charge per ton-kilometre, as for all the other traffic an increase in the charge per ton-kilometre of 2.5 % will be noted as compared with 1925.

B. — Possible revision of the normal rates.

Mr. Leverve's report gives details of the proposed revision of the normal rates, which is now being considered in commercial and industrial circles.

The system of normal rates in operation in Germany resulting from the revision of 1920 was based on the following principles :

a) To assist long distance traffic by replacing the pre-war kilometric rates by a system of rates which decreased as the distance increased. The result was a relative reduction in the carriage charges for long distances which was balanced by an increase in these charges for short distances. It should be pointed out, however, that the lowering of the rates is not so marked in Germany as in the other countries in general, whilst the carriage charges for short distances are relatively higher.

b) Fix rates more favourable to raw materials, the supply of which offered particular difficulties immediately after the war, and against this, increase the rates on finished goods. To do this, the pre-war horizontal grading of the rates, that is to say, according to the class of goods, was altered by increasing the base rates of the higher classes of goods, and by lowering those of the lower classes. The difference between the rates of the two extreme classes which was 61.4 % in 1913, has been increased to 74 %.

In addition, the gradation of the dispatch charge for the usual classes has been abolished, and the charge which, prior to the war, increased with the distance, has been fixed at the same amount for all distances, which represents a further increase in carriage charges for short journeys.

This method no longer seems to be in complete agreement with the alterations the stabilisation of the mark has caused in the financial position of Germany. With the clearing up of the railway position, the Company considered towards the end of 1924 the time had arrived to appoint a Commission to consider the revision of the rates system. This Commission had to examine the alterations to be made to the rates system in force, as well as the horizontal gradation without, however, considering the question of the level of the tariffs. The new system resulting from the revision should produce the same monetary return as the old one.

The Commission presented its report towards the end of 1925 :

a) The vertical gradation of the tariffs, that is to say, their reduction depending on the distance, should not be altered;

b) The horizontal gradation should be altered so as to lessen and equalise, as much as possible, the differences in price between two succeeding rates. Two new classes should be inserted in the existing six. The increase in the number of classes would allow the tariffs to be applied to be better graded according to the value of the goods, whilst by reducing the number of special rates it would make it easier and also less costly to the Company to grant special reduced rates for certain classes of merchandise. There would be a reduction in the base rates for the first three classifications which would reduce the transport rates for the most valuable goods, especially finished products, and this reduction would be made good by a slight increase for the last but one class, which includes nearly half the traffic at normal rates;

c) The expedition tax for each class would remain the same for all distances;

d) The increase applied to the principal class of 15 tons to get the rate of the classification for 10 tons would have to be reduced. As compensation, the percentage increase for the 5-ton classification would have to be raised.

As a result of the increase in the carrying capacity of wagons, the carriage charges on the principal classes of goods, which before the War were based on 10-ton loads have been based on 15-ton loads : two secondary classes have been made for 10-ton and 5-ton loads; the second class for 5 tons alone existed before the war.

The Commission also proposed the reduction in the carriage charges for fast traffic by complete wagon load and the suppression of certain supplementary charges.

The proposed revision of the normal rates was discussed by the Permanent Tariff Commission at its meeting of the 20 January 1927 at Garmisch, at which the increase of class E rates and of the rates on 5-ton loads was strongly criticised. It was in the end decided to nominate a Committee to investigate the question and prepare its proposals for the next meeting of the Commission in June.

X. — Canals and navigable waters.

The preceding report gave particulars of the large programme for the construction of canals and the improvement in navigable waterways. The present report shews that this programme would be completed in ten years and would involve a total expenditure of 650 million marks to be supplied by the State, to which must be added the 200 millions from the Provinces. However a growing opposition has revealed itself against this programme.

Realising the importance of the canal question, the Company was led last year to request the Minister of Transport that it should be consulted during the preliminary discussions and be allowed to present its objections before the construction of any new canal was decided upon. During the negotiations that resulted, the Company brought out all the disadvantages that the completion of the vast programme would present, not only as regards its financial position, but also as regards that of the country. In particular, as regards the construction of the Hansa-Kanal and of the Aix-la-Chapelle to the Rhine canal intended to help the transport of coal from the Ruhr and Aix-la-Chapelle coalfields, the Company shewed by detailed reports that, owing to its transportation capacity in the districts concerned, without extension, it could move all the traffic that would go to the canals and at rates as favourable as those that would be given by the new canals.

In reply to the negotiations, the Company was asked to undertake for ever to give the same favourable rates as the projected canals would have offered, taking into account the total cost of construction, that is to say, including interest and amortization of the capital cost.

The Company considers, that generally speaking, it is able to carry goods under the same rates as the canals, but that obviously it could not bind itself beforehand to grant particular rates for certain traffic conditions unless it had proof that for these conditions there was a real possibility of water transport. As a matter of fact, the tariff policy of the Company has to be determined, not only by taking into account the needs of one or other part of the country, but also by its own financial position, which cannot be foretold for any length of time. On the other hand, if the Company had to grant a reduced tariff to any particular district to prevent a canal being built, the result would be to give this district a special advantage which would not be in agreement with the rule of equal treatment that the Company had to follow in its operation, and would expose it to strong claims from other parts of Germany. It is not easy to see how it could meet such claims without seriously affecting its receipts.

These points shewed the danger of particular agreements such as those the Company was asked to give, not only as regards the Company's financial position, but also as regards the interest of the country as a whole. It therefore appeared preferable to consider the problem from a different point of view and separately from the tariff question. By continuing to develop the State Railways' equipment, by perfecting its technical methods of operation, the carrying capacity of the Railways will be increased and cost reduced : this will enable the carriage charges to be reduced. In this way, the advantages expected from the construction of waterways, always very costly, will be obtained at less cost.

XI. — Ways and Works

A. — Safety appliances.

In 1926, the Company spent on renewals, extension and improvements of the signalling and various safety appliances, telephones, etc., about 26 700 000 Reichsmark, of which 19 270 000 were charged to revenue and 7 430 000 to capital. These sums do not include the cost of ordinary maintenance nor that of safety works provided when building new lines or stations.

The State Railways has put into service the automatic block system with track circuiting, using monophase alternating current on the Berlin-Lichterfelde-Ost line worked by electric traction. It is installing the same system on the City Railway crossing the City of Berlin between the Silesia and Charlottenburg stations.

B. — Maintenance and renewal of the track.

Renewals and ordinary maintenance of the track in 1926 cost a total of about 449 million marks, 251 for material and 198 for wages. Part of this expenditure was covered by a grant of 30 million mark given by the State to prevent stoppage of work.

The prices of 1926, as compared with those of 1913, shew an increase of 20 % for rails, 23 % for metal sleepers, 41 % for wood sleepers, 82 % for ballast and 84 % in the average annual wage per workman. As the total expenditure set aside for renewals and maintenance is 77 % above that of 1913, the report considers that the State Railways cannot be criticised for having cut down these expenditures too far.

The State Railways use metal sleepers very extensively. On the whole of the lines of all kinds of the State Railways, 39.3 % at the 31 December 1926 were laid on metal sleepers and 60.7 % on wood.

The chief reason for using metal sleepers is to be found in the insufficient output of the German forests. To help the Forestry Service, the Company uses about 75 % of the sleepers in soft wood (fir and pine) and 25 % in hard wood (oak and beech), the latter being kept for the parts of the line most used, such as tunnels, curves, and steep gradients.

C. — New works.

The Company has continued to carry out its programme of new works, including principally the construction and electrification of new lines and the building of houses for its staff.

The outlay in these works chargeable to capital during 1926 amounted to a total of 267 100 000 Reichsmark.

The provision made in the 1927 budget as regards capital expenditure amounts to 352 million mark.

Amongst the new lines built, the report mentions the Niebüll-Westerland line, about 40 km. (25 miles) long, connecting the State Railways to the Island of Sylt in the North Sea, the building of which made it necessary to construct an emembankment about 11 km. (7 miles), 11 m. (36 ft.) wide at the top and 50 m. (164 ft.) at the base. The new line should be opened to traffic on the 1 June 1927. These very heavy works involved a total expenditure of 25 million mark, of which one-fifth was provided by a subsidy from the Prussian State.

The State Railways, on its formation, owned 107 708 houses for its staff. This number had risen to 111 705 by the 31 December 1925 and to 112 272 by the 31 December 1926, that is to say, one house for every 6.3 employees.

The outlay for the construction of these houses during the years 1924-1925 and 1926 was 18 000 000 Reichsmark and 2 600 000 Reichsmark respectively.

XII. — Electrification work.

A. — Electrification of main lines.

Ignoring the city and suburban lines of Berlin and Hambourg already electrified, of a length of 80 km. (50 miles) and 35 km. (22 miles) respectively, and the 175 km. (110 miles) being electrified at or around Berlin, the German system includes 1 031 km. (641 miles) of main lines operated by electric traction, and 189 km. (117 miles) the electrification of which is in progress.

The report shews the geographical distribution of the main lines already electrified and the capital cost thereof, but excludes the Munich-Rosenheim line (55 km. = 34 miles) which has just been opened to traffic (see table 13).

Table 14 gives particulars of the lines the Company operates electrically.

With the exception of some secondary lines of little importance, monophase alternating current at low frequency (16 2/3 periods) at a tension of 15 000 volts distributed by overhead lines on

TABLE 13.

Main lines already electrified.

DISTRICT.	Length in kilometres (in miles).	Capital expenditure (million marks).	
		Fixed plant not including workshops.	Rolling stock.
Bavaria	479 (297.6)	32.5	33.8
Silesia	262 (162.8)	18.5	14.4
Central Germany	179 (111.2)	18.0	14.3
Baden.	49 (30.4)	...	...
Saxony	5 (3.1)	4.0	2.1
Altona (from the main station to the port)	2 (1.2)		
Totals. . .	976 (606.3)	73.0	64.6

the whole of these lines is used. The same kind of current is used by the Austrian Federal Railways, the Swiss Federal Railways, the Bernese Alps Railways, the Swedish and the Norwegian Railways.

The current used on the State Railways is usually supplied by power stations belonging to the Company (Mittelsteine station for Silesia, Muldenstein for Central Germany, Saalach and Cartenau for the South-East of Bavaria) or by stations in which the Company is interested financially, in which latter case the current it takes is generated by machines definitely set aside to supply the railway alone (Walchensee and Middle-Isaar station). A few of the less important lines take their current supplies from private stations.

The rolling stock used by the State Railways on lines other than those of Berlin and Hamburg consists of 321 electric locomotives and 31 motor-coaches; 28 additional locomotives and 22 motor-coaches are under construction.

B. — Electrification of the Berlin and Berlin suburban lines.

The electrification of the city, the circle, and the Suburban lines at Berlin — described in the preceding report — began in 1926 and progresses steadily, and the Company hopes the lines in question will be put into full working towards the end of 1928.

For these lines, 345 motor coaches and 354 trailers, as well as all the equipment and electric material of importance, including 264 km. (164 miles) of high tension cable for 30 000 volts have already been ordered.

The Company has continued its investigations with a view to reducing the weight of the stock to be used on the electricified lines. The motor coaches will only weigh 35.5 tons instead of 40 tons as estimated, and the trailers 26 tons instead of 32 tons.

XIII. — Rolling stock position.

At the 31 December 1926, the available rolling stock was as follows :

Steam locomotives	25 616
Electric locomotives.	301
Diesel locomotives	4
Electric motor coaches picking up current.	343
Accumulator-electric or petrol-electric motor coaches	210
Passenger vehicles	63 476

Brake vans	21 556
Post vans (belonging to the Company)	532
Freight vehicles (including 227 174 covered and 434 448 open)	661 622
Service vehicles	8 685

The expenditure on new rolling stock amounted to 64 million marks in 1926. Amongst its stock the State Railways own 200, 50-ton capacity self-discharging wagons used for carrying coal. It has also ordered in addition 40 self-emptying wagons of 60 tons capacity.

TABLE 14.

DISTRICT.	LINES.	Length.	
		in kilometres.	in miles.
	A. — Lines electrified before the Company was formed.		
	Total length	563	349.8
	B. — Electrified lines put into service since 1 October 1924.		
Bavaria	Munich to the frontier near Mittenwald	124	77.1
—	Tutzing-Kochel	36	22.4
—	Weilheim-Peissenberg	9	5.6
—	Box 10 Penzberg (goods station) to Penzberg (passenger station)	3	1.9
—	Munich (Central station) Gauting (suburban line)	19	11.8
—	Munich-Herrsching	38	23.6
Central Germany	Madgeburg (Central station) Madgeburg (Rothensee)	6	3.7
Bavaria	Munich-Laim-Pasing	3	1.9
—	Munich-Laim-Moosach	6	3.7
—	Munich-East-Feldmoching	16	9.9
—	Munich-East (passenger) Rosenheim	55	34.2
—	Munich-Neufahrn-Ratisbonne	138	85.7
—	Munich-Laim-Munich-South	5	3.1
—	Munich (Central) Munich-East (passenger)	10	6.2
	Total	468	290.8
	C. — Lines now being electrified.		
Silesia	Königszelt-Breslau	49	30.4
Bavaria	Rosenheim-Kufstein	34	21.1
—	Rosenheim-Freilassing	82	51.0
—	Pasing-Maisach (suburban line)	24	14.9
	Total	189	117.4

At the 1 January 1927, against previous orders 197 steam locomotives, 29 electric locomotives, 382 motor coaches, 405 passenger vehicles, 15 brakes, 2 062 freight vehicles and 71 service vehicles had still to be delivered.

In addition to orders for new rolling stock, the Company spent considerable sums in bettering its existing stock, such as by strengthening the buffing and draw gear, etc. Finally, the fitting of the Kunze-Knorr continuous brake on the freight vehicles, begun in 1918, was completed; the cost is estimated at a total of 297 million marks, and the Company considers this amount will be completely paid off before the end of 1928 by the operating economies effected.

[656 .1 (.494) & 656 .2 (.494)]

Railway and motor competition in Switzerland.

We reproduce below from the *Bulletin des Transports internationaux par chemins de fer* the report made to the Swiss National Council by the Federal Councillor, Mr. Haab, the Head of the Posts and Railways Department, in reply to a question adressed to the Minister concerned as to the formation of the Swiss Company known as the « Sesa ».

The « Sesa », « Suisse Express Société Anonyme », is a private company formed through the initiative and with the participation of the Federal Railways. Its object is : 1. to support endeavours tending to improve the movement of passengers and goods; 2. to operate undertakings of all kinds having any connection with the carriage of passengers and goods. Its first duty is to institute a supplementary service which ensures the cartage of goods between individuals, as well as from the consignors' premises to the Federal Railways and from the Railways to the premises of the consignee. In addition, it can, by agreement with existing official carrying agents, either on its own initiative or at the request of the Railway Company, organise a supplementary distributing and collecting goods service over longer or shorter distances. It is not allowed to organise transport services paralleling the Federal Railway Company's lines either directly or by roundabout routes except with the Railway's consent. It is at liberty to conclude agreements with private firms either to operate or to farm out the supplementary services it has to provide.

The « Sesa » commenced operations on the 1 January 1927.

During the debate in the Swiss National Council, the Federal Councillor, Mr. Haab, Head of the Posts and Railways Department, after speaking of the danger both the State Railways and the private companies ran, through the steady increase in motor vehicles, continued as follows :

The formation of the « Suisse Express S. A. » (« Sesa ») was an action, it might indeed be said, a legitimate act of defence, taken in the fight against the competition of motor vehicles. No sooner was the intention of forming the Company known than protests were raised by the motor vehicle owners, who were afraid the new organisation would compete with their business. The Railway Administration was therefore expected, it would seem, to allow its traffic to be taken from it bit by bit without striking a blow in its own defence.

When towards the end of the first half of last century the railways came into being, thousands of horse transport undertakings had to go out of business, although up to that time they had carried the traffic. The motor vehicle during the last ten years has not asked permission to compete with the railway : the « Sesa » will not be required to ask in its turn if its activities meet the wishes of the motor owners. The public also has never protested against the existence and activity of the « Sesa »; the complaints only come from the private hauliers.

The carriage of goods can be divided into three parts : cartage from the consignor's premises to the station; carriage by railway to the destination station; and, finally, delivery from the station to the consignee's premises. One of the principal advantages of motor transport lies, not so much in the lower costs, as in the fact that the motor conveys the goods direct from the premises of the consignor to those of the consignee, neither having to concern himself with collection and delivery cartage, sometimes more costly than the whole railway carriage. To this has to be added the shorter time taken, the avoidance of transhipment, the simpler contractual formalities, easier packing requirements, etc.

As regards convenience, reasonable cost and quickness, the « Sesa » also should, as far as possible, automatically assure the same benefits to its customers on a largely conceived and uniform plan free from any private interest.

In the interest of the public, Article 22 of the law on railway rates required the railways to organise at the principal stations an official cartage service which operates if the users of the railway prefer not to cart to or from their premises, or are unwilling to arrange with a cartage agent to do it. The railways have also the right to undertake the cartage itself, or to enter into cartage agreements with cartage contractors to enable this work to be done in accordance with a fixed scale of charges.

As a matter of principle, the railway would also be within its rights if it included the cartage charges in its carriage charges. If in order to get traffic it were their interest to do so, they could even do the work either without charge, or charge part of the cost and bear the balance. In order therefore to obtain a paying traffic, the railway can take any action it thinks fit. On the other hand, the ordinary cartage contractors are not forbidden to work for those who require their services. It should not be forgotten, however, that the private contractors work under more favourable conditions than the official agents, seeing that they are not under any obligation to do cartage work; they can decide not to work districts with little traffic, and, in addition their legal responsibilities are less severe.

Finally, the official cartage contractors have to undertake not to compete with the railway in any way. It is therefore incorrect to say the Railway Administration wishes to ruin the private cartage firms. These considerations must not be overlooked if the equitable and economical character of the « Sesa » is to be appreciated. As regards the official cartage work, the « Sesa » is the contractor; so far as other transport is concerned, it gets the traffic in the interests of the railway.

The arrangements in force up to the present have been found to be wasteful in that, for example, the official carrier has had to carry a few cases or packages from the station to some distant quarter of the town, whilst at the same time other independent carriers were going to the same place without full loads. The « Sesa », and reciprocally the owners of lorries or the carriers who will become its agents, will do away with this parcelling out of the cartage and will thereby contribute to a more rational organisation, and, in consequence, give the public a cheaper service. The official carriers have indeed realised this : in fact, all the companies, to wit about a hundred, have almost without exception contracted to work from now on as agents of the « Sesa » which, for the moment, will not purchase vehicles of its own. The Association of Swiss Carriers has also concluded a contract with the « Sesa ». The « Sesa » is now able to offer to the users of the railways, cartage rates as much as 40 %, but on the average 15 to 20 %, lower than before. The reduction of rates having had to be introduced generally as from a certain date before any increase in traffic could result, the « Sesa » granted subsidies to its agents : but as the traffic grows these payments will diminish, and at the proper time cease altogether. In certain places, these subsidies have already been stopped.

As we have seen above, the railways are able without question to act in this way : they could in fact bear the whole of the cartage expenses themselves. The rates granted at the present time by the « Sesa » do not appear to be ruinous : a certain number of independent cartage agents have already agreed that they will in future work under the same conditions, or even at lower prices. The work of the « Sesa » has consequently already had a salutary effect.

It has been pretended that the character of the « Sesa » has not been made sufficiently clear. These suggestions cannot be easily understood; there is nothing mysterious at all about it. The « Sesa » is not a conspiracy, but a private company, founded in full daylight. It is true that the Federal Railways, being the most important railway system, hold most of the stock : but there is, in addition, a large number of individual firms and private railways holding stock.

It was with the deliberate object of enabling the secondary railways to benefit by the advantages of the « Sesa » that it was not affiliated to the Federal Railways, although it would have been quite possible to do so. The secondary lines have thoroughly appreciated the fact, and most of them already take part in the organisation. The bye-laws of the new Company have been published in the Swiss official journal of commerce : the contract with the Federal Railways is not secret, as it has been published in a technical paper. A copy has been issued to everyone asking for it. The Management of the « Sesa » has also given in detail in the daily press its object and character, and is ready to give anybody applying to it, information as to its activities.

Outside the cartage service dealt with above, the « Sesa » also intends to serve localities lying at a distance from the railway (§ 71 al. 4, of the transport regulation). It would carry goods in these districts and collect them for delivery to the nearest station. This is a case of a collection service.

This supplementary transport service ought, if possible, to be carried out by private firms, and it is only in cases where such arrangements cannot be come to that the « Sesa » reserves the right to undertake this work, or to arrange for its agents to do so. This duty of the « Sesa » ought then not to be carried out in opposition to the interests of private firms, but with their collaboration.—The « Sesa » and the railways working with it can, however, themselves fix the conditions under which this collaboration shall be made : it would not be practicable in fact to deny them the right of fighting, legitimately, the intense competition of the motor vehicle. Here again, its action is quite contrary to any monopolistic tendency.

If the question be asked : what result is to be expected of the « Sesa », the reply ought to be as follows : From the financial and economical point of view, improvements in the organisation of transport are expected, and subsequent to the « Sesa » obtaining traffic, the railways ought to recover, at least in part, the traffic, they have lost during recent years : in addition, the transfer of traffic from the railway for the benefit of the motor lorry ought to be stopped to some extent. If in the beginning it is necessary to make certain sacrifices, it is expected that these will soon be recovered by increased traffic, and that, little by little, an appreciable growth in the traffic receipts will be registered.

In addition to the first successes in the cartage field, due to the « Sesa », we hope it will also succeed in its task of recovering traffic to the profit of the railways. The results it has produced in this respect in a short time are very gratifying.

After only a few months' existence, the « Sesa » has succeeded in recovering traffic worth about 1 200 000 francs lost, or about to be lost, to the railways, so that it is expected that about three million francs worth will ~~be regained~~ during the first year. More than a third of the firms negotiated with have decided in future not to use motor transport.

A further recovery of traffic can be expected as a result of a new proposal, according to which, for internal traffic as well as for through traffic using their lines, the Swiss railways will introduce special rates against motor transport in the way previously done to meet reduced foreign rates.

The Federal Railways, like the normal gauge private lines and many of the narrow gauge systems, have in particular decided to carry for the future goods of all kinds at rates equivalent to the usual cost of carriage by motor lorry. According to the terms of the notice inserted in the *Feuille officielle des chemins de fer* (Official Railway Journal), this measure is subjected to the condition that it applied to traffics which had transferred to motor transport, or threatened to do so, that the rates so granted procured to the railway a return in proportion to its commitments, that the consignor undertakes to put on rail each year a minimum quantity of goods, and also to give up either wholly, or in part, using motor transport.

Protests have also been raised against such measures being taken by the railways. It is pretended they would be contrary to the law on transport which declares nul and void any agreement by which one or several consignors benefit by reductions of rates and which declares legal only those reductions of rates properly published and equally available to all under the same conditions. To this the following answer must be given : This requirement of the law on transports of 1893 resulted from the fact that the railway had in fact a monopoly of transport, and that without the intervention of the legislator it would have been possible for it to have given preference to certain users over others, or to favorise certain districts by an arbitrary fixing of the rates. Now, on the one hand, the transport monopoly no longer exists as a result of the introduction of the motor vehicle (*cessante ratione legis, cessat lex ipsa*), and, on the other hand, if this question be examined closely, it will be seen that the rates granted by the Railway Managements with a view to meeting road competition do not form rates reductions in the sense of the legal prescripts mentioned above. In giving a consignor rates equal to the railway cost prices, to be paid on the supposition of the goods being sent by road, the railway grants him no advantage he is unable to get otherwise. In fact, it is not the railway which has enabled the consignor to send his goods at lower rates than other people can. If he finds himself in this privileged position, it is not due to the railway, but to the fact that he can use motor transport. So that by bringing the railway rates to the same level as those of motor transport, the railway does not create, as regards the users, a difference in rates which does not already exist. If the railways were willing to give up rates measures of this kind, they would simply lose these traffics and the motor would profit thereby : so far as the consignor is concerned, the carriage charges would remain the same. It is therefore not just to say that the « Sesa » is only an artifice to get round the requirements of the law on transport.

These considerations shew that the interests of the public, as guaranteed by the transport law, have not suffered as a result of the measures taken by the railways. As I have just said, it is a question not of any innovation, but of the application of a method to which railway managements have always had recourse in fighting lower rates of other railways. The scales of these newest rates have also been legally approved in principle.

The application of the new arrangements necessitated in each case negotiations with the consignors : the « Sesa » carried them through both in the case of internal traffic as for the through traffic of the private lines. It was instructed to conform strictly during the negotiations with the legal principle of equal treatment to all so long as the conditions remained alike.

The Federal Railways remunerate the « Sesa » on practically the same principles as those applied to the great travel agencies, that is to say, in accordance with the percentage of traffic these agencies bring to the railway. These discounts will undoubtedly be reduced to the strict minimum, seeing that the « Sesa » is not a money-making company, and has only a small staff. A large number of Governments and railways have already investigated the organisation of the « Sesa », and in other countries, where the laws on railway rates are much the same, similar measures or similar companies are suggested. It is therefore considered elsewhere that this method of meeting road transport competition is both effective and legal.

(*Neue Zürcher Zeitung*, Nos. 1133 and 1139
of 4 and 5 July 1927.)

MISCELLANEOUS INFORMATION

[625 .4 (.42)]

1. — Mails by underground.

Post Office (London) Tube Railway.

Figs. 1 to 5, pp. 253 to 256.

(*Modern Transport.*)

After many delays the early completion is anticipated of the new tube railway by means of which Post Office mails will be conveyed between Whitechapel in the east and Paddington in the west of the Metropolis. It may be remembered that, shortly before the outbreak of the war, the General Post Office had formed the conclusion that it would be desirable to substitute for the present system of road van service a more up-to-date method of transporting letter and parcel mails between the principal post offices and railway stations in London with a view to accelerating the service and contributing to the reduction of congestion of the roads. A committee specially appointed to study this question in all its bearings, after careful inquiry on the Continent and in America as to the relative advantages and disadvantages of pneumatic tubes and railways, found that the best solution would be an underground railway worked electrically.

Shield-driven tunnel.

A scheme was accordingly prepared in detail, and tenders were invited first for the construction of the tunnel. The progress of the work was considerably delayed by conditions arising out of the war, but the tunnel was completed by the summer of 1916, and only certain subsidiary works at the stations remained to be executed. The tunnel is shield-driven through the London clay, and is constructed of cast-iron segments bolted together, the space between the outside of the cast-iron tunnel and the inner surface of the clay being filled in with grout. At the few points where the construction was through water-bearing strata compressed air was employed and the joints between the segments were caulked with lead. The depth of the tunnel beneath the road surface varies between 50 and 80 feet. Work on the railway was suspended when the tunnel was completed, but at the end of the war tenders were invited for the electrical equipment of the railway, latitude being given for the reception of offers for any alternative scheme to that which had been prepared. Here again some postponement was necessary owing to the high prices which then prevailed; but eventually, in the summer of 1924, contracts were placed for the electrical equipment, rolling stock, conveyors and lifts, for a scheme which corresponded to the basic scheme.

The new railway.

The railway included in the scheme which is now practically completed, as shown on the sketch map (fig. 1), will connect the Paddington district office and the Eastern district office, in Whitechapel Road, a distance of roughly 6 1/2 miles. There will be intermediate stations at the Western district parcel office; the Western district post office, Wimpole Street; the Western Central district office, New Oxford Street; the Mount Pleasant parcel office; King Edward Building post office, Newgate Street; and at Liverpool Street station. Three of the stations, namely the Western Central district office, Mount Pleasant, and King Edward Building, will form important junctions when extensions to the north and south are eventually undertaken.

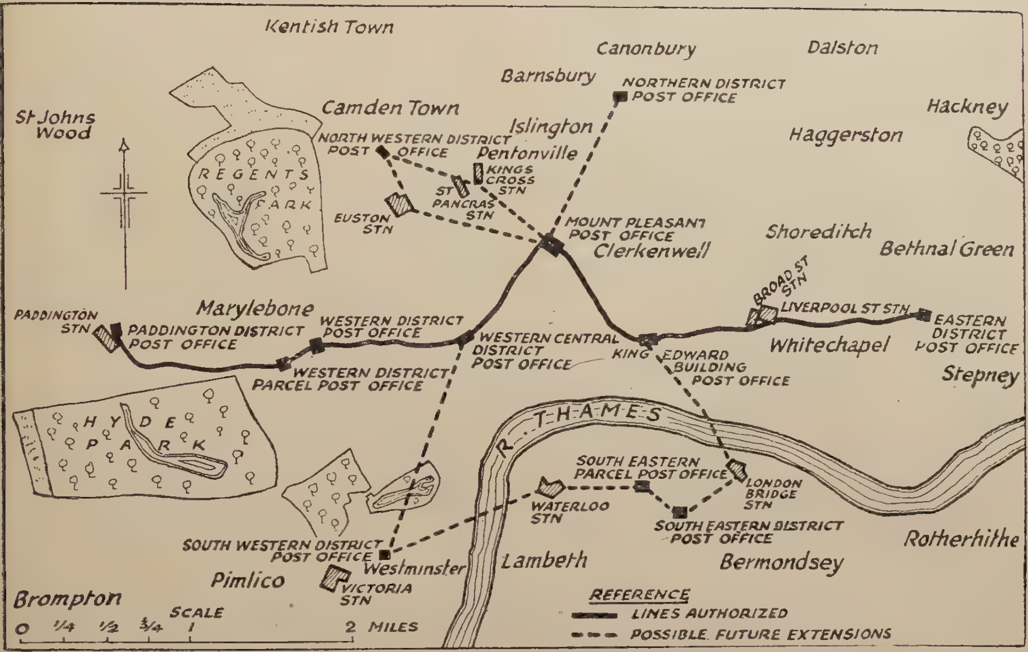

Fig. 1. — Map shewing route of the new Post Office (London) Tube Railway.

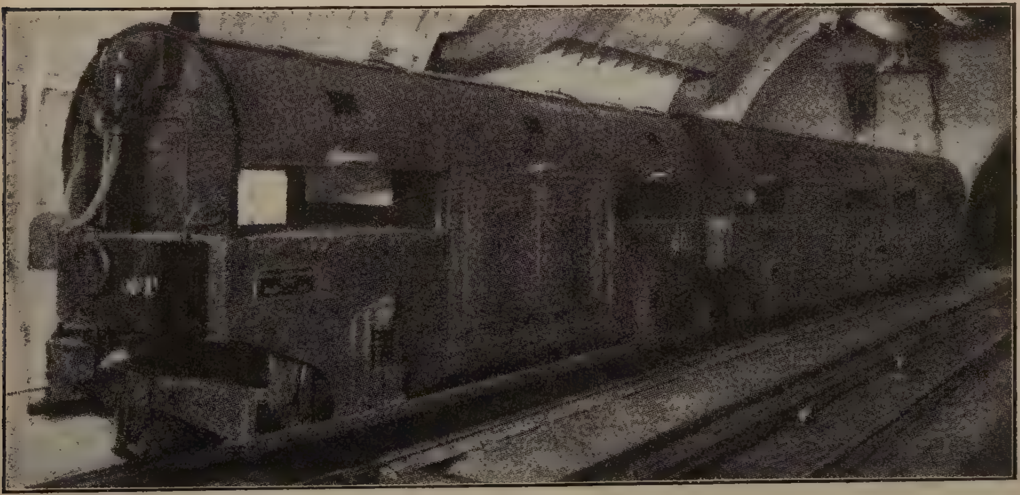

Fig. 2. — Two of the steel motor wagons to be used on the Post Office Tube Railway.

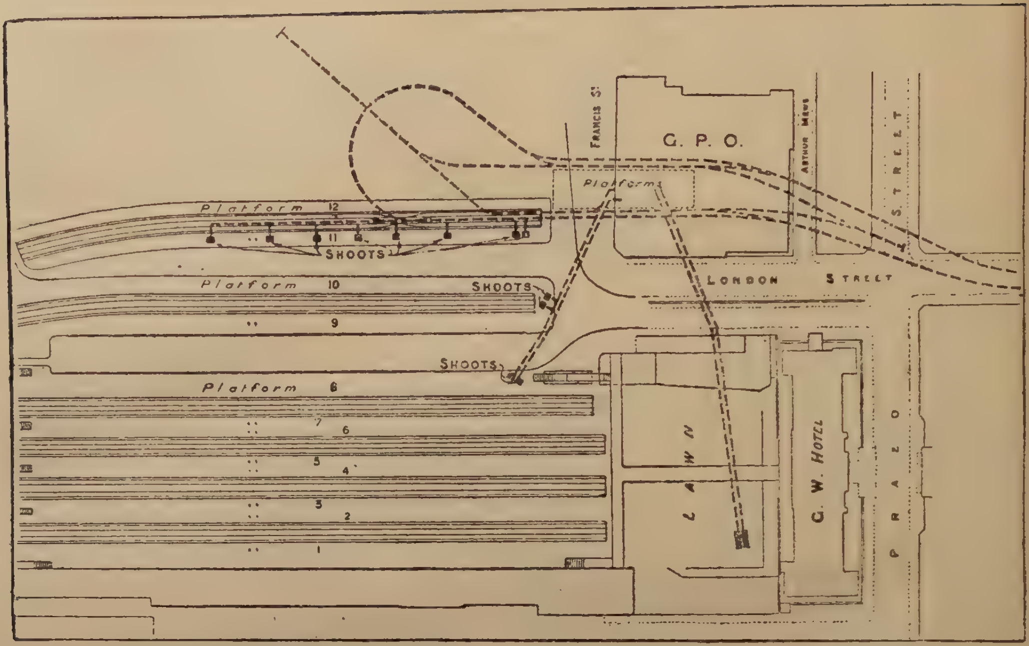

Fig. 3. — Plan shewing the arrangement of the tracks and conveyors at the Post Office Tube Railway at Paddington station.

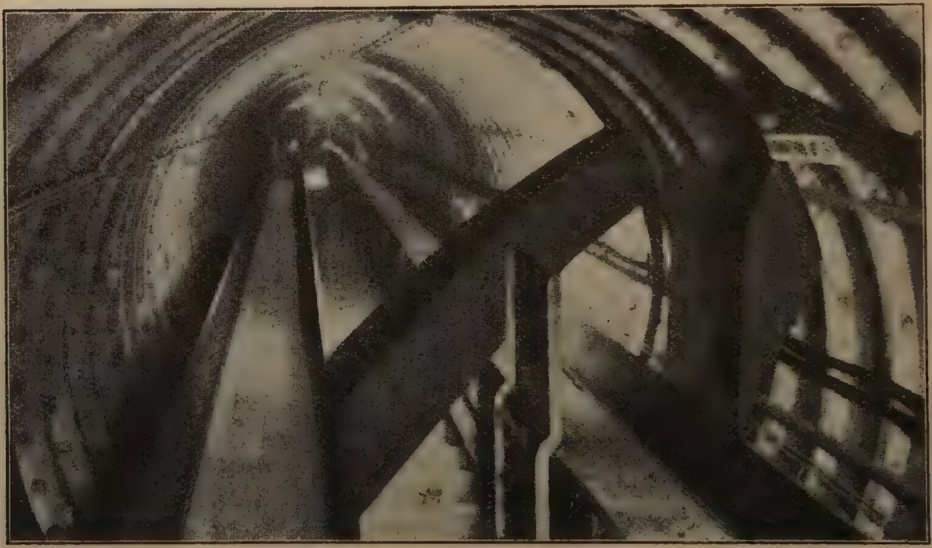

Fig. 4. — Two of the shoots leading to the conveyor bands below Paddington station by means of which mails will be conveyed to and from the Post Office Tube station.

Operation.

Between the stations the railway consists of two tracks, each 2-foot gauge, one for east-bound and the other for west-bound traffic, and contained in a single tunnel of 9 foot-internal diameter, opening out to 25 feet at the stations. The station platforms and lines are above the general level of the track, so that an approaching train will have to climb a gradient of 1 in 20, and descend a similar gradient when it proceeds on its journey. By this arrangement high speeds will be attained, with a minimum of power consumption, and it is anticipated that as much as 35 miles an hour will be possible. The trains will be operated without drivers on the remote-control system. They may consist of one, two or three wagons, and as they come to rest in, or pass through, the stations, they will not need the continuous attention of the switchman.

Control.

The position and destination of each wagon will be notified to this officer on an illuminated diagram. By means of small levers in the cabin he will then set points for the particular route desired and will energise certain sections of the line with the appropriate current. The wagon will then come to rest at the proper section of the platform, or will run through the station without further attention. The operation of the points will be interlocked with the application of the current, and there will be a complete interlocking arrangement between the different routes. The system of control may be briefly described as being generally similar to the power-operated point and signal systems adopted for modern railway undertakings, but with the signal element replaced by the application of power. It is only by such a system of complete interlocking that a remote-control electrical railway of this scope can be safely operated.

Stations.

Each station consists of an island platform arranged in two sections, between which is placed a control cabin and the lifts and conveying appliances specially designed to suit the different classes of postal matter which have to be dealt with between the station platforms and the postal buildings above. This is the general design of station which has been adopted in all cases, the arrangement of the tracks and of the conveying appliances being adjusted to suit the requirements at the different points. At the stations the handling of traffic will be performed almost entirely by mechanical power. There will be spiral shoots for downward mails and lifts for upward mails, and at the principal stations electrically-operated conveyor bands will be installed beneath the platforms. By means of circular shafts the sorting rooms above are connected with the tube railway below. The ends of the shafts are underneath the tube platforms, and in the floor of each platform there are apertures every few yards, beneath which runs and endless band, feeding the conveyors and lifts. As a train is unloaded, mail bags will be dropped through these apertures, and then transported by the conveyor to elevators or lifts, and thence to the sorting rooms, the aim being to avoid man-handling from the moment the mails are dropped through the apertures on to the conveyor. The arrangements are indicated in figure 4.

Paddington.

Through the courtesy of the *Great Western Railway Magazine* we are enabled to reproduce a drawing (fig. 3) showing the arrangements at Paddington station. The broken lines indicate the route of the Post Office Tube Railway and its terminal facilities. It will be observed that there are three systems of conveyors, one serving platform No. 11, another platforms Nos. 8, 9 and 10, and the third the departure side of the station. Inwards mails will be dropped down the shoots, which are also indicated on platforms Nos. 8, 9, 10 and 11, on to conveyor-bands connecting with the Paddington district post office. Outwards mails for despatch from the main line station will be carried from the post office by underground conveyor to a structure on « The Lawn », the circulating area at Paddington for parcels and mails traffic. In this case three conveyor bands will be used — two to bring the mails from the post office, and the other, travelling laterally, to serve as a distributing band from which the mails will be discharged to platform trollies for conveyance to the trains.

Rolling stock.

The rolling stock consists of ninety steel motor wagons of the type illustrated in figures 2 and 5. The overall length of each car is 13 ft. 5 in., width 2 ft. 10 in., and height 4 ft. 11 1/4 in., energy being obtained from a conductor rail, and the carrying capacity is 10 cwt. Thus, with all cars in service, it is estimated that it will be possible to move 45 tons of mails in each direction. The relief to congestion in the streets will be appreciated when it is borne in mind that there are over 750 tons of postal business to be dealt with daily and that approximately 800 journeys a day will be made at an average of 20 miles per hour as compared with from 5 to 7 miles per hour by road. The whole of the electrical equipment for the railway has been installed under the supervision of the engineering department of the General Post Office, the contractors being the English Electric Co., Limited, of Queen's House, Kingsway, W. C. 2, whilst the Siemens and General Electric Railway Signal Co. Limited, of Central House, Kingsway, were responsible for the power signalling. The total cost of the work will be approximately £1 600 000. We hope shortly to be enabled to amplify this preliminary survey by the publication of a detailed technical description of this most interesting and extensive undertaking.

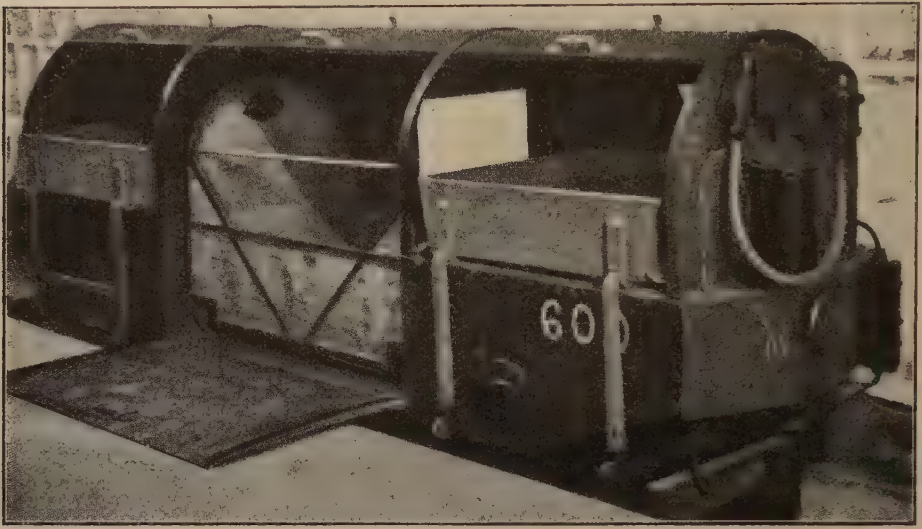

Fig. 5. — Near view of a Post Office tube wagon with sliding cover open to receive the load. It will be noticed that containers are a feature of this new transport system.

[625 .14 (09 (.73)]

2. — The evolution of track on American railways,

as depicted in exhibits displayed at the Centerary Exhibition of the Baltimore & Ohio at Halethorpe, Md.

Figs. 6 to 13, pp. 258 to 260.

(Railway Engineering and Maintenance.)

Track No. 1 represents the first type of construction used in 1830 on the original main line between Baltimore, Md., and Ellicott Mills. This track was built of iron strap rails, about 2 1/2 inches wide and 5/8 inch thick, spiked at about 18-inch intervals to 6 by 6-inch stringers which in turn were notched into the cross ties. The cross ties were spaced about 3 1/2 to 4 feet apart and secured to the wooden stringers by means of wooden wedges driven on the inner side of the mortise.

Track No. 2 represents the second type of construction used in 1830 on the original main line between Baltimore, Md., and Ellicott Mills. This type employed the same strap iron rails and spike fastenings as shown in track No. 1, but with the rails supported on rough cut granite sills, which were about 12 to 18 inches across the top, 6 to 12 inches deep, and from 8 to 10 feet long. These sills were supported in a relatively thin layer of granite ballast.

Track No. 3 illustrates the sill, tie, stringer and edge rail construction used in 1835 in the original main track between Relay, Md., and Washington, D. C. The bottom 6 by 6-inch sills, laid in a sandy ballast, supported 6 by 10-inch hand hewn ties which were notched to carry the 6 by 6-inch top stringers that supported the rails. This rail was the first step toward the pear-shaped and tee rails used later. It was furnished in lengths of about 15 feet and weighed 40 lb. per yard.

Track No. 4 shows the type of construction used in 1842 on 96 miles of line between Harper's Ferry, W. Va., and Cumberland, Md. This track was essentially the same as that designated as No. 3, except that U-shaped rails were used, and the bottom sills were suported on stone ballast. The U-shaped rail used in this track was the first rail manufactured in any quantity in America. This rail, which was spiked to the stringers with light-weight hook spikes, came in 20-foot lengths and weighed 51 lb. per yard.

Track No. 5 represents the pear-shaped rail weighing 60-lb. per yard used in 1851 and 1852 in the original line between Cumberland, Md., and Wheeling, W. Va. This rail, which was made of iron, was spiked directly to cross ties laid in a deep bed of hand-knapped granite ballast. The rail was 3 1/2 inches high and came in 20-foot lengths. The rail joints were soft iron plates secured to the ties by four spikes.

Track No. 6 illustrates the type constructed in 1869 for the renewal of the older types. It is practically identical to that shown in the previous illustration except for the type of rail joint and the fact that the rail used was of steel instead of iron. This rail, which was pear-shaped, was rolled in England and was known as John Brown rail. Its weight was 60 lb. per yard and it came in varying lengths up to about 30 feet. The joint consisted of wooden splice blocks bolted through the webs.

Track No. 7 is the oldest example on the Baltimore & Ohio in which rails of the modern T-section were used. It illustrates track laid in 1874 with rails weighing 67 lb. per yard. The joints consisted of angle bars and the rails were secured direct to the cross ties by cut spikes. Track Nos. 8 and 9 (not shown here) were examples of similar but heavier construction used in 1889 and 1908, in which the rail was of 85-lb. and 100-lb. section respectively.

Track No. 10, the last one in the exhibit, represents the type of construction used today on important main lines of the Baltimore & Ohio. It consists of 130-lb. R. E. section rail laid on creosoted ties. This standard was first used in 1921. The added feature in this construction is the tie plate which, however, was already used in track No. 9 with 100-lb. rail.

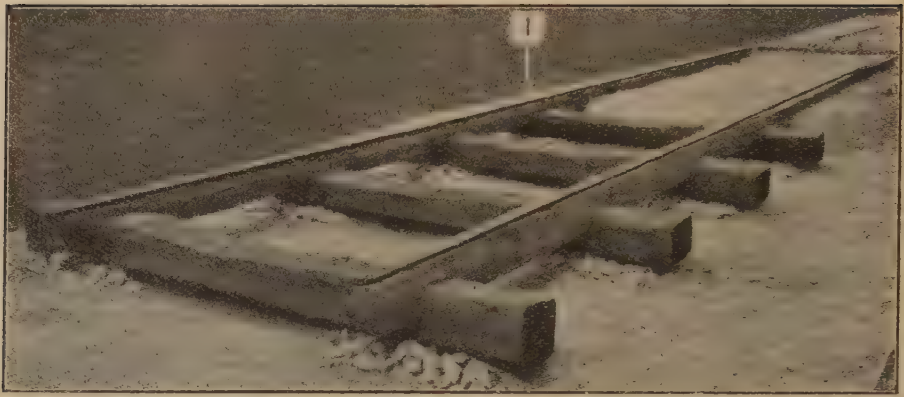

Fig. 6.

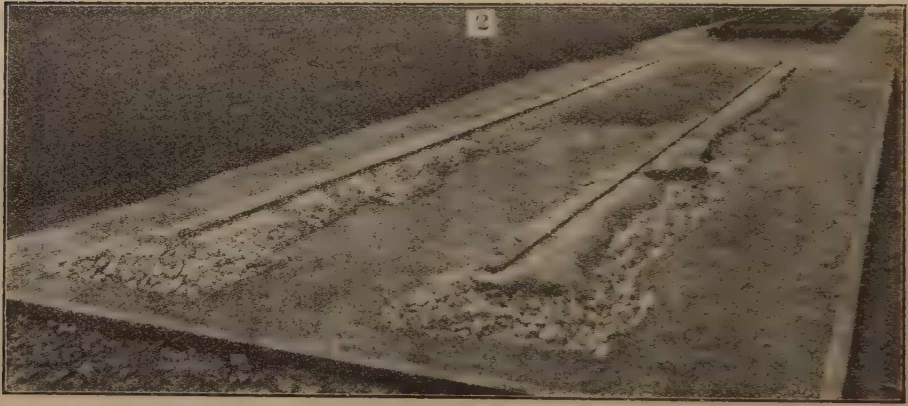

Fig. 7.

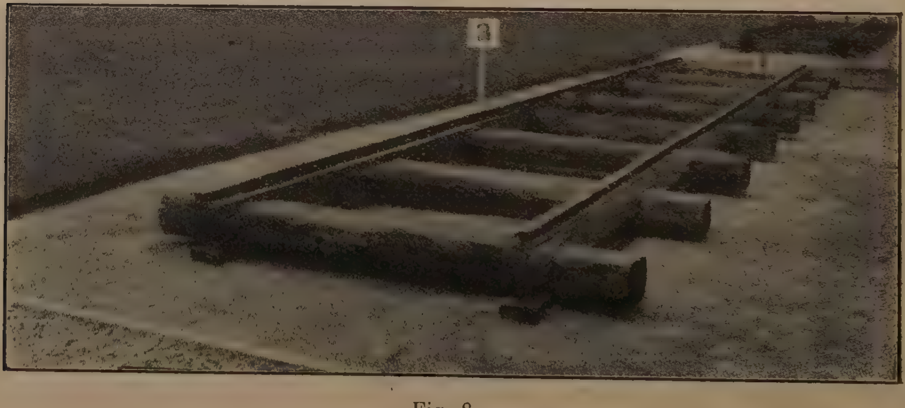

Fig. 8.

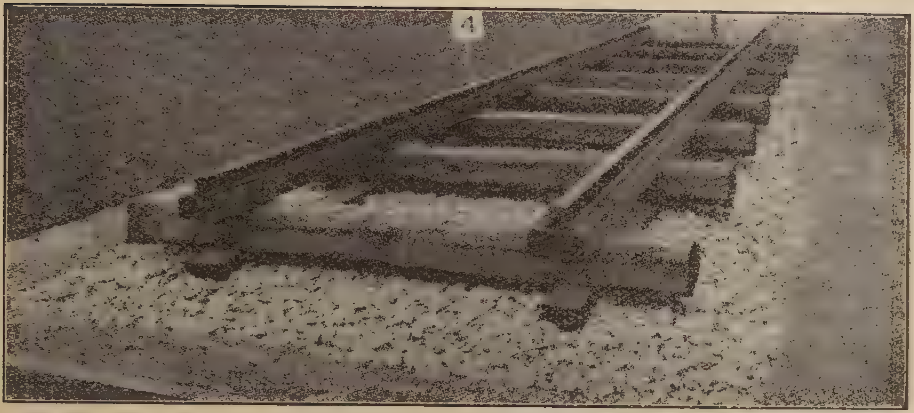

Fig. 9.

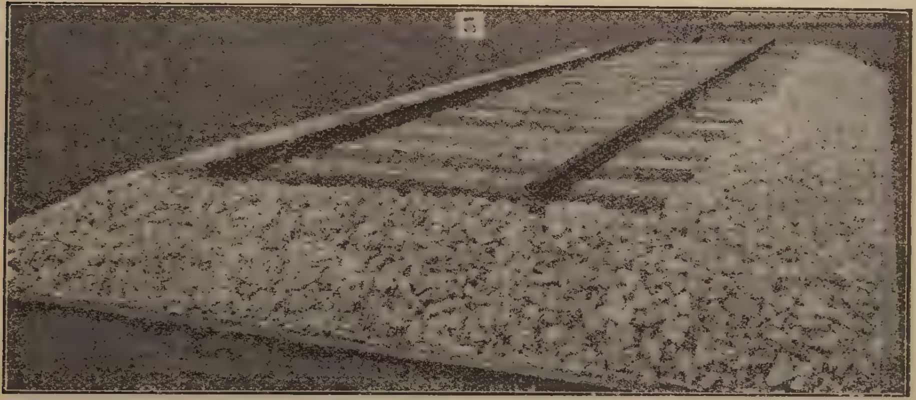

Fig. 10.

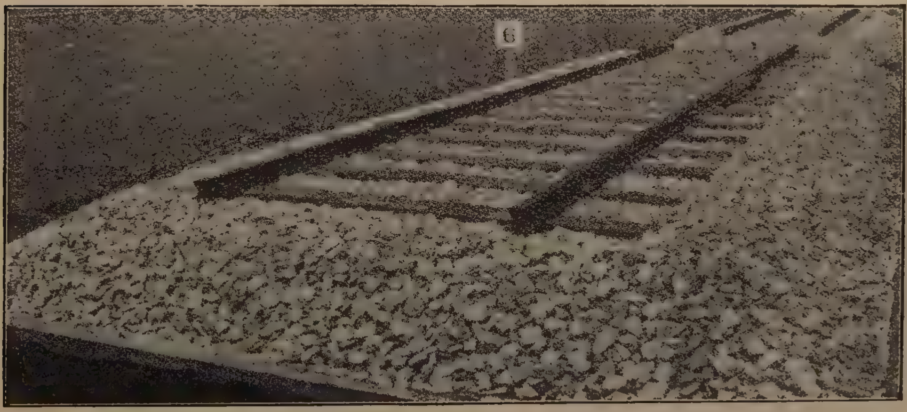

Fig. 11.

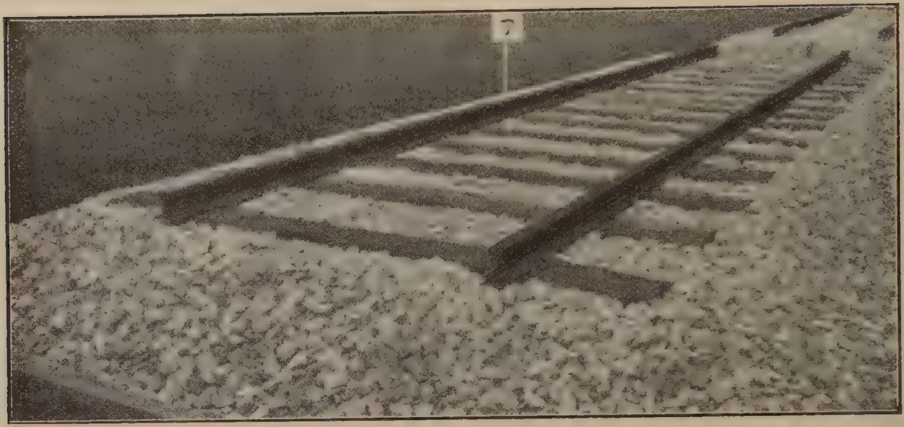

Fig. 12.

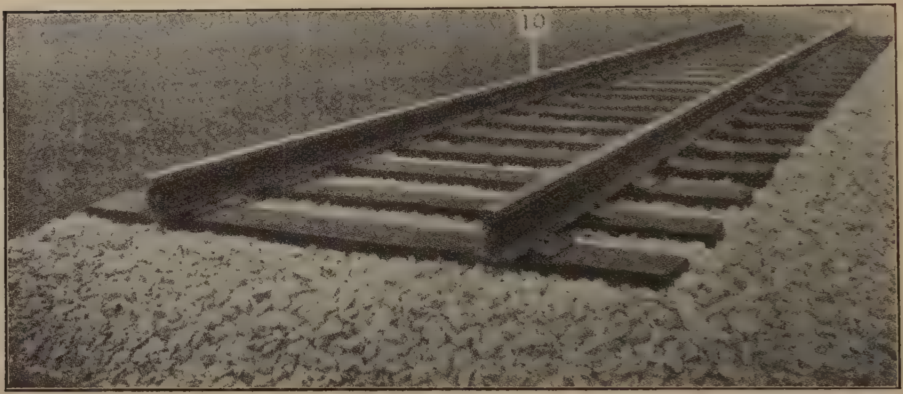

Fig. 13.

[**625** .245 (.42) & **656** .261 (.42)]

3. — Road-rail traffic on the London Midland & Scottish Railway.

Figs. 14 to 21, pp. 262 and 263.

(*The Railway Gazette.*)

The use of containers in the handling and transportation of merchandise constitutes a question which, in one form or another, has occupied the attention of railway executive officers from time to time in connection with the intensive development of freight operation, but more particularly from the point of view of the possible economies or other domestic advantages to be derived from the consequent saving in time and labour. They have, of course, been used for many years under particular circumstances, as, for example, in the case of luggage and parcels between London and Ireland or the Continent and involving cross-channel services, while in the case of goods traffic an outstanding instance is afforded by the late Lancashire & Yorkshire (now London Midland & Scottish) Railway in the use of « flats » — a form of container — in connection with their extensive traffic in cotton goods. From the point of view of the trader, however, the inherent advantages of a system of transport affording « door-to-door » conveyance of merchandise, thereby avoiding the customary handling at railway depots, are apparent, and the march of progress, coupled with the development of competitive forms of transport, has during recent years brought this aspect of the question into increasing prominence.

The London Midland & Scottish Railway has over the past two years been engaged in an exhaustive programme of research on the subject, accompanied by experiments which latterly have been carried out on a scale sufficiently extensive to afford a practical test of the possibilities of the system and to demonstrate its various features as affecting both the railway and the trader. In the course of these experiments a sum of £20 000 has been expended, representing a total stock of between 400 and 500 containers, which have in the main been built in the London Midland & Scottish Railway carriage and wagon works at Derby.

Container types.

As a result of the experience gained, four types of container have been evolved as standard, two representing the equivalent of the covered van and two the equivalent of the open wagon. The various types are shown in the accompanying illustrations, and details as to dimensions and carrying capacities are given below :

Closed containers, types A and B.

TYPE.	Dimensions (interior).			Capacity		Tare.
	Length.	Width.	Height at centre.	in tons.	in cubic feet.	
A	7 ft. 0 in.	6 ft. 0 in.	6 ft. 6 in.	2 1/2	273	16 cwt.
B	13 ft. 6 in.	6 ft. 0 in.	6 ft. 6 in.	4	526	25 cwt.

Open containers, types C and D.

TYPE.	Dimensions (interior).			Capacity, in tons.	Tare.
	Length.	Width.	Height of sides.		
C	7 ft. 0 in.	6 ft. 0 in.	3 ft. 9 in.	2 1/2	9 cwt.
D	13 ft. 4 in.	6 ft. 0 in.	3 ft. 9 in.	4	17 cwt.

In arriving at the various types, due regard has been necessary to the normal capacity of cranage and cartage equipment, while at the same time affording the largest possible capacity coupled with the lowest possible tare. Up to the present the containers have been of timber construction, although attention is being given to the possible use of steel or other metal.

The closed type containers are fitted with

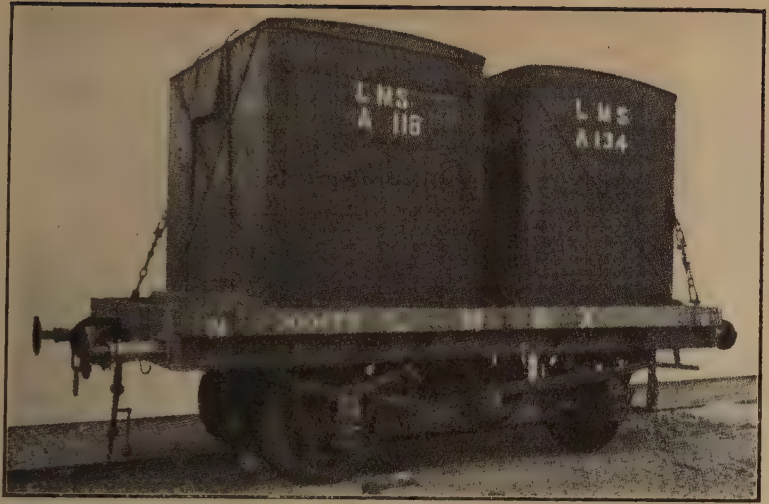

Fig. 14. — « A » type small closed containers.

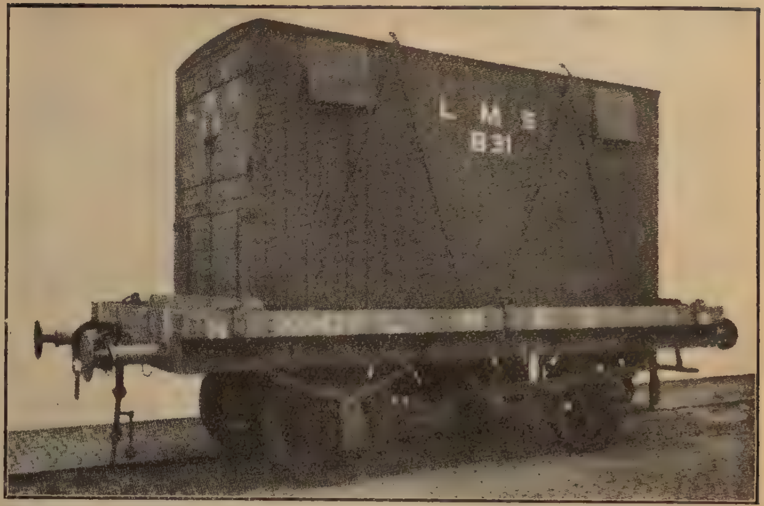

Fig. 15. — « B » type large closed container.

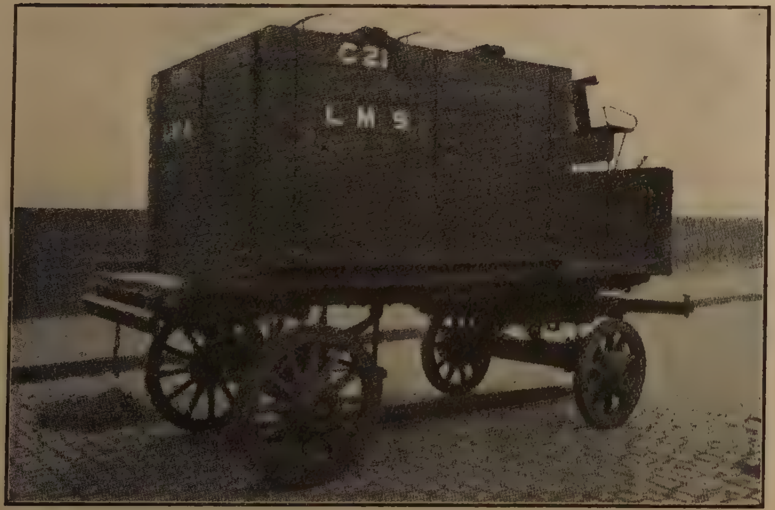

Fig. 16. — « C » type small open container and

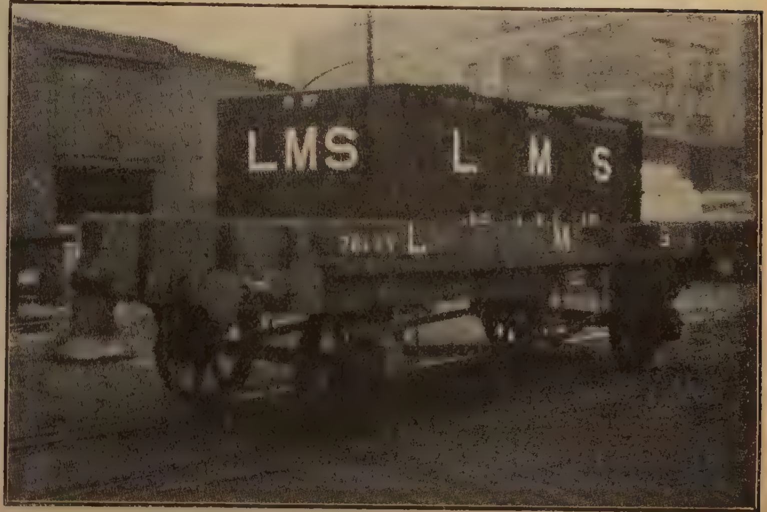

Fig. 17. — « D » type large open container in position

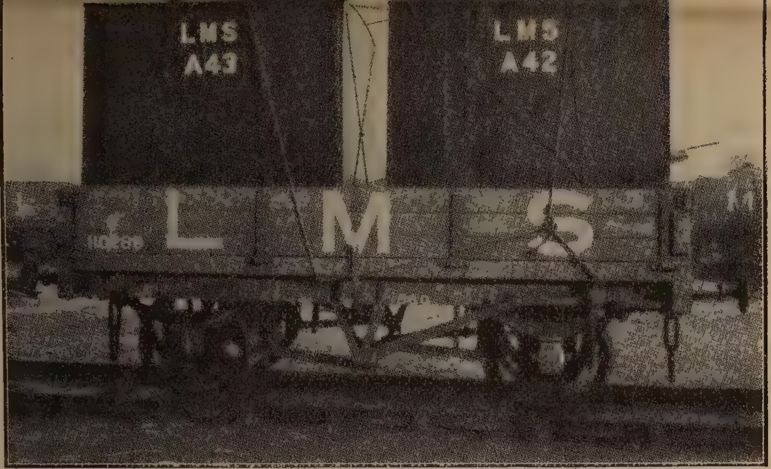

Fig. 18. — Two « A » type containers on special wagon body.

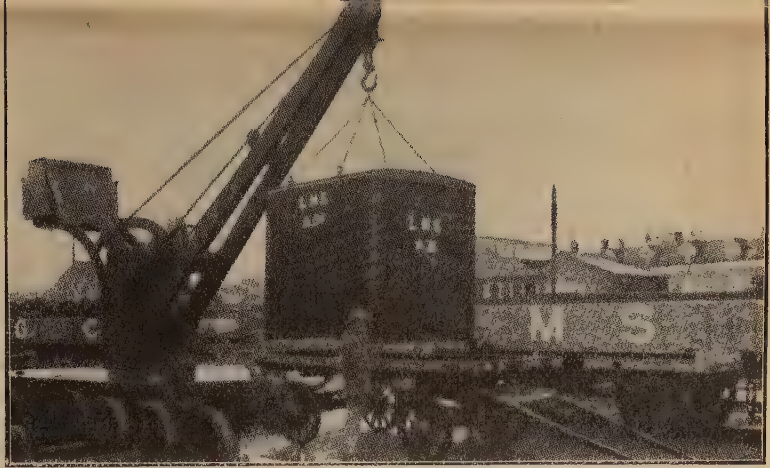

Fig. 19. — Lifting type « A » container from wagon to lorry.

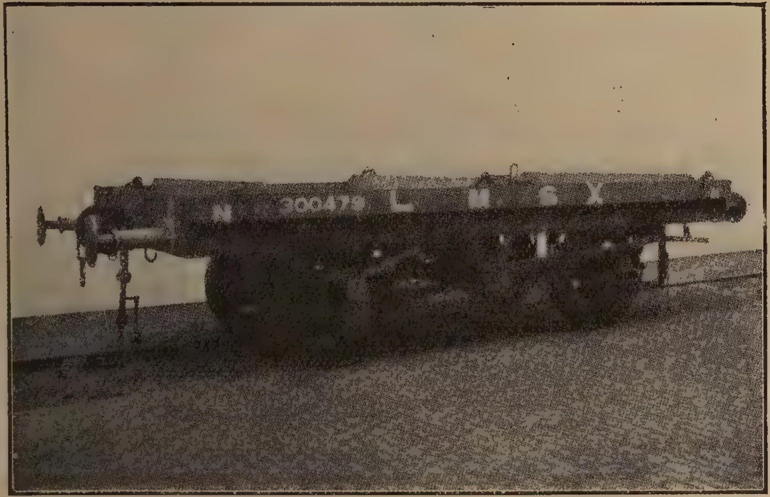

Fig. 20. — Special container wagon underframe.

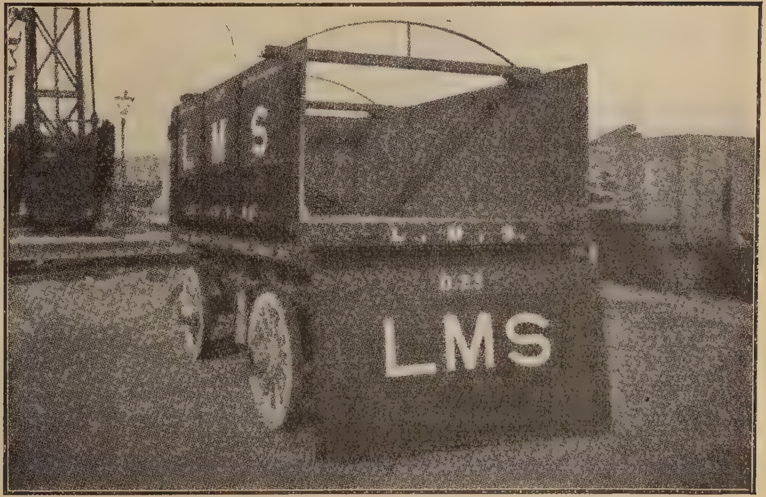

Fig. 21. — « D » type container on lorry.

end doors, comprising a drop door at the bottom and a pair of swing doors above. A certain number are fitted with louvred ventilators in order to provide for traffics of a perishable nature. In the case of the open type containers both sides and ends are detachable, but the inevitable detraction from the strength of the walls has certain disadvantages, and consideration is being given to a new type « D » container having side drop doors, as in the case of the usual open wagon, and a single drop door at one end. These containers are lifted from eyes fitted at the base of the sides, and in order to prevent « binding » of the crane chains, a « spreader » has been provided, through the grooved ends of which the crane chains are passed, and which at the same time is adapted to reinforce the strength of the sides. This « spreader » has formed a convenient foundation for the sheet bow, and the whole attachment can be clearly seen in one of the illustrations.

Lifting tackle and crane power.

Generally speaking, the ordinary four-leg chain has been found quite suitable for the process of lifting, and, in conjunction with the « spreader » just mentioned, can be safely used with the open-type containers, except where loads happen to be built appreciably above the level of the sides, when cross-trees are essential.

The question of crane power has not assumed that prominence that might have been anticipated, owing mainly to the fact that traffic falling within the scope of operation by container tends to move between the larger or medium stations where crane power is adequate. The more serious prospect, assuming the adoption of the system on any scale, is that of congestion, particularly where fixed cranes only are available, and in this connection, attention is being given to the possible use of a mobile crane of capacity sufficient to cope with the maximum gross load which can be undertaken with the present standard stock.

Research is also being made with the object of evolving a type of container of the roll-off type, *i. e.*, on wheels or castors, to obviate the necessity for a crane for transferring between rail and road vehicle.

Special underframe or chassis.

While in the experimental stage generally the containers have been conveyed in ordinary open wagons, there is no reason why the rail vehicle should represent more than the underframe and running parts of the usual wagon. An experimental chassis of this description appears in one of the illustrations. The vehicle is fitted with screw couplings and automatic vacuum brake, but apart from this, represents the underframe of the London Midland & Scottish standard wagon, with the addition of timbered floor, securing chains, and suitable detachable cross-bars fitted transversely in order to aid in keeping the container or containers firmly in position.

Control methods.

With the gradual development of the number of stock in use, some method of control was found to be essential if light running was to be kept down and the stock worked as economically as possible. A system was, therefore, established, the whole of the stock being placed under the control of the Chief Goods Manager at Euston, although a certain amount of local autonomy was accorded the respective District Goods Managers so far as requirements within the limits of their particular districts were concerned. All movements of container stock are telegraphed to the control at Euston, where they are recorded on a wall-board by means of tickets — different coloured tickets being used for the respective types of container. The wall-board shows at a glance the following information in respect of each district :

1. Traffic waiting, *i. e.*, stock required;
2. Supplied for loading;
3. Arrival for delivery;
4. On hand empty.

In this way it is possible to meet all shortages to the best advantage, and to manipulate the stock with the maximum of loaded user. In spite of the comparatively limited scale on which operations have been conducted, the proportion of loaded mileage has reached the vicinity of 80 %, which speaks highly for the efficacy of the system.

In dealing with this phase, it must be remembered that the development of the container by the London Midland & Scottish Railway Company has been in the main in the direction of its application as a « full-load » instrument, and movements of stock are, therefore, general and not confined to reciprocating streams of traffic between pairs of points.

Conditions of conveyance and charges.

Generally speaking, the use of containers is limited to consignments of one ton or over, from one sender to one consignee, although in suitable circumstances delivery to three or four addresses has been undertaken by special arrangement.

It will be apparent that with a facility of this kind, the operations of the railway company are altogether of a different character from those entailed in dealing with merchandise loaded in ordinary wagons.

The nature of the traffic to be conveyed in containers very largely determines the rates at which the merchandise is carried and conditions as to risk, etc.

The method of charging for container traffic is, however, to be considered by the railway companies in 1928.

Effect on claims for damage, etc.

The experience of the London Midland & Scottish Railway Company in this respect has been noteworthy, as the following examples will show :

400 loads of gas stoves carried for one firm with only six known cases of damage;

100 loads of enamel baths carried with three or four isolated damages;

Several hundred loads of new furniture, gramophones, etc., carried with almost complete immunity from damage;

700 loads of preserves carried for one firm during five months. Claims (which arose mainly in connection with the return empty jars) paid to the extent of 0.22 % of revenue.

In all these cases carriage by rail had dwindled to vanishing point, owing mainly to the growth of road transport.

The London Midland & Scottish Railway Company has found that the container system of railway transport provides the advantages arising from « door-to-door » service, *i. e.:*

1. Risk of damage or loss minimised;
2. Packing costs reduced;
3. Time and labour saved.

It is of interest to note that the use of containers by the London Midland & Scottich Railway has been the means of enabling a number of British traders to compete more successfully against foreign manufacturers for such traffics as enamelware, baths, etc.

[621 .135. (01 (.42)]

4. — Locomotive weights and axle loads.

(*The Railway Engineer.*)

Arising from an inquiry by a correspondent, we have prepared a comparative table showing the maximum weights of engines and tenders in working order, and the maximum load per axle for representative heavy locomotives, both passenger and goods, in service on railways within the United Kingdom. From this it will be noted that, when a comparison is made on the total weight in working order basis, the London North Eastern Railway 2-8-0 + 0-8-2 six-cylinder Garratt articulated engine, weighing in working order 178 tons 3 qrs., is the heaviest locomotive in service; but the maximum load per axle is only 18 tons 6 cwt. 2 qrs., and it must be borne in mind that this engine is constructed for a special service on a particular section of the

London North Eastern Railway system and is not for use over all parts of the main line generally.

The Great Western Railway four-cylinder express passenger locomotives of the « King George V » class, on the other hand, have a maximum axle load of 22 tons 10 cwt. which, at the time of writing, is the heaviest individual axle load to be found on any railway in this country. This is closely approached by the re-boilered Pacific engine, No. 4480, of the London North Eastern Railway, which has a maximum axle load of 22 tons 1 cwt. The total weights in working order of these engines, complete with tenders, are, however, 135 tons 14 cwt. and 152 tons 11 cwt., respectively. Until the last two years the maximum axle load permitted has been generally about 20 tons, but in the more recent big locomotive designs weights above this have become usual, due to the improvement and strengthenings carried out on the underbridges and permanent way, permitting the greater adhesive weight and consequent increased tractive effort with higher boiler pressures to be utilised.

—	Total weight of engine and tender in working order.		Total weight of engine in working order.		Maximum load per axle.	
	Tons.	Cwt.	Tons.	Cwt.	Tons.	Cwt.
London & North Eastern Railway :						
3-cylinder 4-6-2 with 220-lb. boiler pressure.	152	11	96	5	22	1
3-cylinder 4-6-2 with 180-lb. boiler pressure.	148	15	92	9	20	...
6-cylinder 2-8-0 + 0-8-2	...	...	178	0 ¾	18	6 ½
3-cylinder 2-8-2	151	8	100	0	18	13
London Midland & Scottish Railway :						
3-cylinder 4-6-0	127	12	84	18	20	18
4-cylinder 2-6-0 + 0-6-2	...	...	148	15	20	5
4-cylinder 4-6-4T	...	...	99	17	18	16
Great Western Railway :						
4-cylinder 4-6-0	135	14	89	...	22	10
Southern Railway :						
4-cylinder 4-6-0	140	4	83	10	20	13
2-cylinder 4-6-4T	...	...	98	10	19	...

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OFFICIAL INFORMATION

ISSUED BY THE

PERMANENT COMMISSION

OF THE

INTERNATIONAL RAILWAY CONGRESS ASSOCIATION.

QUESTIONS

FOR DISCUSSION AT THE MADRID SESSION (1930)

WITH

THE NAMES OF THE REPORTERS

1st SECTION : WAY AND WORKS.

I. — The use of concrete and reinforced concrete on railways.

A) Investigation into the respective merits of the different designs of concrete sleeper.

B) Concrete and reinforced concrete buildings.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — X... (an American).

Belgium, France, Italy, Portugal, Spain and their Colonies and Switzerland. — Mr. Jullien, ingénieur en chef de la voie et des travaux de la Compagnie du Chemin de fer de Paris à Orléans, place Valhubert, 1, Paris (13e), and Mr. Claise, directeur du contrôle des travaux des lignes nouvelles et de la voie et des bâtiments au Ministère des travaux publics de France, boulevard Saint-Germain, 244, Paris.

Other countries. — Mr. Krick (E.), ingénieur, inspecteur de la Direction générale des Chemins de fer de l'Etat des Serbes, Croates et Slovènes; Belgrade.

II. — Resistance of rails against breakage and to wear.

A) First causes of rail breakage; measures taken to reduce the number of breakages, both as regards the way rails are used and the conditions of inspection.

B) Quality of metal used for rails to give normal wear. Conditions governing manufacture and inspection.

Rails: profile and quality, length, weight, and cross section of the rails.

C) Rail joints. The most economical and efficient design.

Reporters:

America. — Mr. Abbott (R. B.), assistant general superintendent, Reading Company; Reading, Pa

Great Britain, Dominions and Colonies, China and Japan. — Dr. S. Matsunawa, doctor of engineering, chief of the railway research Office of the Japanese Government Railways; Tokyo.

Other countries. — Mr. Cambournac, ingénieur des Ponts et Chaussées, ingénieur en chef des études, matériel des voies et bâtiments de la Compagnie du Chemin de fer du Nord français, rue de Dunkerque, 18, Paris (10^e), and Mr. Patte, ingénieur principal des constructions métalliques et du matériel fixe à la Compagnie des Chemins de fer de l'Est français, rue de l'Aqueduc, 68, Paris.

III. — Investigation into the static and dynamic stresses in railway bridges.

Reporters:

America. — X... (an American).

Great Britain, Dominions and Colonies, China and Japan. — Sir Henry Fowler, K. B. E., chief mechanical engineer, London Midland & Scottish Railway (member of the Permanent Commission), Derby, and Mr. Ellson (G.), engineer, Southern Company, Waterloo, London, S. E.

Belgium, France and their Colonies. — Mr. Ronsse (A. A. C.), ingénieur en chef, and Mr. Desprets (R.), ingénieur principal, both at the Société nationale des Chemins de fer belges; rue de Louvain, 17, Brussels.

Other countries. — Mr. Fava (Alberto), ingénieur, inspecteur en chef supérieur au service de la voie des Chemins de fer de l'Etat italien; villa Patrizi, Rome.

IV. — Recent improvements in permanent way tools, and in the scientific organisation of maintenance work.

Reporters:

America, Great Britain, Dominions and Colonies, Holland and Colonies, China and Japan. — M. Maas Geesteranus (H. P.), ingénieur en chef, chef du service des voies et travaux des Chemins de fer néerlandais; van Limburg Stirumplein, 1, Utrecht.

Belgium, France, Italy, Portugal, Spain and their Colonies. — Mr. Mendizabal (Domingo), ingénieur, sous-chef de la voie de la Compagnie des Chemins de fer de Madrid à Saragosse et à Alicante; Red Antigua, Pacifico, 2, Madrid.

Other countries. — Mr. Hauer (Jaun), ingénieur, conseiller ministériel et chef du Département IV/3 au Ministère des chemins de fer de Tchécoslovaquie; Prague.

IInd SECTION : LOCOMOTIVES AND ROLLING STOCK.

V. — Locomotives of new types; in particular, turbine locomotives and internal combustion motor locomotives.

Construction, efficiency, use and repair.

Reporters :

America. — X... (an American).

Great Britain, Dominions and Colonies, China and Japan. — Mr. Maunsell (R.E.L.), C. B. E., chief mechanical engineer, Southern Railway; Waterloo Station, London, S. E. 1.

Belgium, France, Italy, Portugal, Spain and their Colonies. — Mr. Cossart, ingénieur principal, chef des services des ateliers de machines à la Compagnie du Chemin de fer du Nord français; rue du Faubourg-Saint-Denis, 179ter, Paris (10e).

Other countries. — Mr. Koller (Paul), ingénieur, conseiller ministériel, sous-directeur des Chemins de fer de l'Etat tchécoslovaque, Direction Praha-Jih; Prague.

VI. — Improvements in the steam locomotive.

Increased pressures and higher superheats. Improvements in the design of superheaters and parts connected with superheating. Feed water heating and air preheating. Improvement of valve gears.

Reporters :

America. — X... (an American).

Great Britain, Dominions and Colonies, China and Japan. — Mr. Gresley (H. N.), chief mechanical engineer, London & North Eastern Railway; King's Cross, London, N.

France, Italy, Portugal, Spain and their Colonies. — Mr. Parmantier, ingénieur principal attaché au service central du matériel et de la traction de la Compagnie des Chemins de fer de Paris à Lyon et à la Méditerranée; boulevard Diderot, 20, Paris (12e).

Other countries. — Mr. Bals (Théodore), inspecteur général des Chemins de fer de l'Etat roumain; Strada Sébastopol, 12, Bucarest.

VII. — Electric locomotives for main line traction.

a) passenger locomotives ; *b*) goods locomotives ; *c*) locomotives for mountainous country. Multiple unit traction.

Reporters :

America. — Mr. Duer (J. V. B.), electrical engineer, operating department, Pennsylvania Railroad; Altoona, Pa.

Great Britain, Dominions and Colonies, China and Japan. — Dr. K. Asakura, chief of machinery and rolling stock section, bureau of mechanical engineering, Japanese Government Railways, Tokyo, and Dr. H. Imaidzumi, chief engineer of machinery and rolling stock section, bureau of mechanical engineering, Japanese Government Railways, Tokyo.

France and Colonies. — Mr. de Boysson, ingénieur en chef du matériel et de la traction de la Compagnie du Chemin de fer de Paris à Orléans, boulevard de la Gare, 41, Paris, and Mr. Leboucher, ingénieur en chef des services techniques du matériel et de la traction de la Compagnie des Chemins de fer du Midi français, rue Théodore de Banville, 19, Paris.

Other countries. — Mr. Bianchi (Giuseppe), ingénieur, inspecteur en chef au service du matériel et de la traction des Chemins de fer de l'Etat italien ; Florence.

VIII. — All steel coaches. — Comparison with vehicles built of wood.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — Mr. Lemon (E. J. H.), carriage and wagon superintendent, London Midland & Scottish Company; Derby.

Belgium, France and their Colonies. — Mr. Lancrenon, chef adjoint des services du matériel roulant de la Compagnie du Chemin de fer du Nord français, rue des Poissonniers, 78, Paris, and Mr. Vallancien, ingénieur principal à l'Office central d'études de matériel de chemins de fer, avenue de Suffren, 100-102, Paris.

Other countries. — Mr. Garcia-Varo (Martin), ingénieur à la Compagnie des Chemins de fer Andalous; Malaga.

IIIrd SECTION : WORKING.

IX. — Relations between railways and sea ports.

Lay-out of maritime stations ; arrangement of outer and inner basins so that the most efficient lay-out of sidings may be provided for working them ; operating and rate fixing methods ; loading and discharging appliances.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — Mr. Jenkin Jones (C. M.), superintendent, North Eastern Area, London & North Eastern Railway; York.

Belgium, France and their Colonies. — Mr. Lamalle (U.), directeur de l'Exploitation à la Société nationale des chemins de fer belges (member of the Permanent Commission); rue de Louvain, 17, Brussels.

Other countries. — Mr. Ehrenfreund (Edilio), ingénieur, chef d'arrondissement des Chemins de fer de l'Etat italien, Turin, and Mr. Belmonte (Ludovico), ingénieur, inspecteur en chef supérieur au service de l'exploitation des Chemins de fer de l'Etat italien, villa Patrizi, Rome.

X. — Methods to be used in marshalling yards to control the speed of vehicles being shunted, and to ensure they travel on to the lines in the various groups of sidings.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — Mr. Byrom (C. R.), chief general superintendent, London Midland & Scottish Railway; Derby.

France, Italy, Portugal, Spain and their Colonies. — Mr. Pellarin, ingénieur en chef adjoint à l'ingénieur en chef de l'exploitation de la Compagnie des Chemins de fer de l'Est français, rue Madame, 1, Paris, and Mr. Farenc, sous-chef de l'exploitation de la Compagnie des Chemins de fer du Midi français, boulevard Haussmann, 54, Paris (9e).

Other countries. — Mr. Fiala (Ctibor), ingénieur, conseiller principal au Département VI/I du Ministère des chemins de fer de Tchécoslovaquie; Prague.

XI. — Signalling of lines for fast traffic and in main stations. Daylight signals. Automatic block system.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — X... (an American).

Belgium, France and their Colonies. — Mr. Willaert (C. C. A.), ingénieur principal au service de la voie à la Société nationale des chemins de fer belges; rue Belliard, 76, Brussels.

Italy, Portugal, Spain and their Colonies. — Mr. Gibert (Antonio), ingénieur en chef des services électriques de la Compagnie des Chemins de fer de Madrid à Saragosse et à Alicante, Pacifico, 2, Madrid, and Mr. Nogués (Julio), ingénieur en chef-adjoint du mouvement de la même Compagnie, Red Catalana, Estacion de Francia, Barcelona.

Other countries. — Mr. Kristensen (J.), ingénieur des Chemins de fer de l'Etat danois; Copenhague.

XII. — Economical traction methods for use in particular cases, as for example :

A) Organisation of train services on the minor lines of the large systems carrying little traffic, and of little used trains on the more important lines of these systems.

B) Use of special tractors for shunting in smaller yards and for certain work in large yards.

Reporters :

America. — X... (an American).

Great Britain, Dominions and Colonies, China and Japan. — Mr. NICHOLLS (R. H.), superintendent of the Line, Great Western Railway; Paddington Station, London, W. 2.

Belgium, France, Italy, Portugal, Spain and their Colonies. — Mr. GAEREMYNCK (O. A.), ingénieur en chef, directeur d'administration au service de l'exploitation de la Société nationale des chemins de fer belges; rue de Louvain, 17, Brussels.

Other countries. — Mr. HUNZIKER (H.), directeur de la section des chemins de fer du Département fédéral des postes et des chemins de fer suisses (member of the Permanent Commission); Berne.

IV^th SECTION : GENERAL.

XIII. — Competition of road transport.

Effect of road competition on goods and passenger traffic and the best methods of meeting such competition, both as regards the main lines and the branches.

Reporters :

America, China and Japan. — Mr. SUDBOROUGH (C. B.), assistant vice-president in charge of traffic, Pennsylvania Railroad; Broad Street Station, Philadelphia, Pa.

Great Britain, Dominions and Colonies. — Mr. WILKINSON (H. L.), assistant superintendent of the Line, Great Western Railway; Paddington, London, W.

Belgium, France, Italy, Portugal, Spain and their Colonies. — Mr. LE BESNERAIS, chef adjoint de l'exploitation de la Compagnie du Chemin de fer du Nord français, rue de Dunkerque, 18, Paris (10e), and Mr. DEGARDIN, ingénieur principal au service central de l'exploitation de la Compagnie du Chemin de fer de Paris à Orléans, place Valhubert, 1, Paris (13e).

Other countries. — Dr. Alexandre WASIUTYŃSKI, ingénieur des voies de communication, président de la Commission pour la reconstruction des gares terminales de Varsovie; Ministère des voies de communication; Nowy Swiat, 14, Warsaw.

XIV. — Use in railway work of machines for simplifying statistical and accountancy work.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — Mr. Eppler (W. E.), comptroller, Delaware and Hudson Company; Nassau Street, 32, New York.

Other countries. — M. Bruneau, ingénieur en chef adjoint au chef de l'exploitation de la Compagnie des Chemins de fer du Midi français, boulevard Haussmann, 54, Paris (9e), and Mr. d'Welles, sous-chef de l'exploitation de la Compagnie du Chemin de fer de Paris à Orléans, place Valhubert, 1, Paris (13e).

XV. — Co-operation of the staff towards increased efficiency and its participating in the profits.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — X... (an American).

Belgium, France and their Colonies. — Mr. Soulez, ingénieur en chef attaché à la Direction de l'exploitation de la Compagnie du Chemin de fer du Nord français, rue d'Amsterdam, 65, Paris (8e), and Mr. Bloch, ingénieur en chef du service du matériel et des ateliers de la Compagnie du Chemin de fer de Paris à Orléans, boulevard de la Gare, 41, Paris (13e).

Other countries. — Mr. del Campo (Rafael Marin), ingénieur du Conseil d'administration de la Compagnie des Chemins de fer de Madrid à Saragosse et à Alicante, and Mr. del Castillo (Jean Cánovas), ingénieur principal de la Direction de la même Compagnie; Pacifico, 2, Madrid.

XVI. — Methods followed in training of staff, professional, technical and ordinary working grades.

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — Mr. L. C. Fritch, vice-président, Chicago, Rock Island & Pacific Railroad; La Salle Street Station, Chicago, Ill.

Belgium, France, Holland, Italy, Portugal, Spain and their Colonies. — Mr. Barth, ingénieur principal attaché à la Direction de la Compagnie des Chemins de fer de l'Est français; rue d'Alsace, 21, Paris (10e).

Other countries. — Mr. Mereutza, sous-directeur général des Chemins de fer de l'Etat roumain (member of the Permanent Commission); Bucarest.

Vth SECTION : LIGHT RAILWAYS AND COLONIAL RAILWAYS.

XVII. — Penetration railways.

Construction :

a) Penetration railways in new countries.

b) Feeder railways in all countries

Reporters :

America, Great Britain, Dominions and Colonies, China and Japan. — Mr. Biggs (A. A.), agent (general manager) of the Madras and Southern Mahratta Railway, Rayapuram (India), and Mr. Lloyd Jones (C W.), C. I. E., agent (general manager) of His Exhalted Highness the Nizam's Guaranteed State Railway, Secunderabad (India).

Belgium, France, Holland, Portugal, Spain and their Colonies. — Mr. Jourdain (Pierre), administrateur-directeur des Chemins de fer secondaires du Nord-Est; rue de Miromesnil, 33, Paris.

Other countries. — Mr. Mellini (Enrico), ingénieur, inspecteur en chef à l'Inspection générale des chemins de fer, tramways et automobiles ; villa Patrizi, Rome.

XVIII. — Improvements in the permanent way equipment of light railways.

Reporters :

Europe. — Mr. Van Noorbeeck, inspecteur général des voies et travaux à la Société nationale belge des chemins de fer vicinaux; avenue des Celtes, 52, Brussels.

Other countries. — Mostapha Bey Hamdy El Kattan, chef-ingnéieur adjoint de la voie des Chemins de fer de l'Etat égyptien; Cairo.

XIX. — Electrification of secondary lines.

Reporters :

Europe. — Mr. Sekutowicz, directeur des services techniques de l'Omnium Lyonnais; rue d'Athènes, 20, Paris (9^e).

Other countries. — Mr. Rivera (D. Eugenio), ingénieur des Ponts et Chaussées d'Espagne, directeur-général du Chemin de fer de Tanger à Fez; Olózaga, 2, Madrid.

XX. — Rail motor vehicles.

Reporters :

Europe (except France). — Mr. Zavadjil (Z.), ingénieur, chef de la division des machines de la Direction générale des Chemins de fer de l'Etat du royaume des Serbes, Croates et Slovènes; Belgrade.

France. — Mr. Beghin (Paul), sous-directeur de la Compagnie des Chemins de fer Départementaux; avenue de Friedland, 10, Paris (8^e).

Other countries. — Mr. Brooks (C. E.), chief of motive power, and Mr. Gage (R. S.), chief electrical engineer, Canadian National Railways; Montreal, Que.